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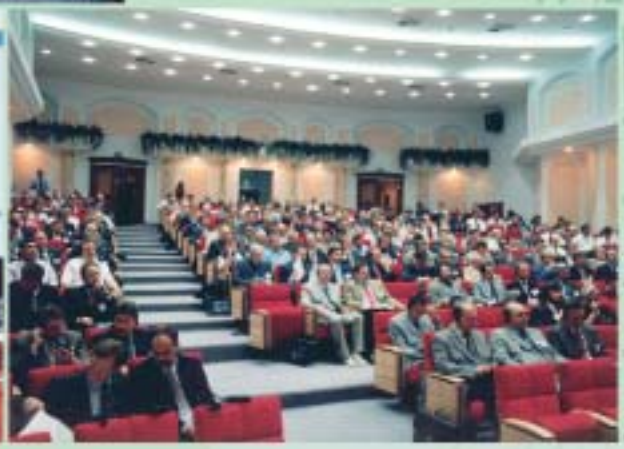

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Press-release

New Emphasis for Oil and Gas Policy set at Roundtable: Business Opportunities in Modern Technologies, Equipment, and Services

ASHGABAT/MOSCOW. June 11, 2002 - A roundtable on the Oil and Gas Sector: Business Opportunities in Modern Technologies, Equipment, and Services, featuring Turkmenistan government officials, was held in Ashgabat, May 28-29. 2002. The roundtable, organized by the Ministry of Oil and Gas Industry and Mineral Resources, and RPI, Inc., a consultant to the ministry, was chaired by Yolly Gurbanmuradov, deputy chairman of the Cabinet of Ministers of Turkmenistan, and co-chaired by Stan Polovets, chairman of the board of RPI, Inc.

Two hundred delegates from the CIS, Europe, the US, and Asia attended the roundtable. International oil and gas majors, as well as equipment manufacturers and field service providers, including Shell, ExxonMobil, TotalfinaElf, Wintershall, Schlumberger, Halliburton, Cameron, Maersk, Technip, Bentec, Saipem, Western Geco, Gazprom, ITERA, LUKOIL, Rosneft, Zarubezhneft, Transneft, and OMZ, were represented.

In their presentations, oil and gas industry decision-makers identified new priorities for developing Turkmenistan's oil and gas complex that will draw on top international accomplishments in sciences and technology. Of special interest is the development of onshore fields by Turkmenistan, which relies primarily on the potential of domestic companies. Those enterprises, in turn, plan to take advantage of the expertise and technologies of a wide range of international service companies. With regard to the development of Turkmenistan's sector of the Caspian Sea and the construction of export pipelines, the country hopes to rely on foreign investment.

In his presentation, Mr. Gurbanmuradov stressed that, at this new stage of development, the state - while continuing to regulate the oil and gas complex - is delegating increasingly greater authority over production and economic activities to domestic corporations and concerns, which are being reorganized as vertically integrated companies. Informing delegates of the planned signing of an intergovernmental agreement in Islamabad on May 30, 2002 by the presidents of three countries to build the Turkmenistan-Afghanistan-Pakistan gas pipeline, Mr. Gurbanmuradov invited international companies to supply equipment and technology to the project.

As part of a new phase in the industry's development, Turkmenistan, together with its foreign partners, hopes to begin development of a comprehensive gas export infrastructure that will move gas from Turkmenistan to regional markets. In addition to Pakistan and India, the infrastructure would encompass Turkey, Southern Europe, China, and the Far East.

Development results in Turkmenistan's oil and gas complex in 2001, the sector's technological and market potential, development prospects for the equipment and field services market, and Turkmenistan's resource and oil and gas potential were extensively reviewed in a report by K. Nazarov, minister of Oil and Gas Industry and Mineral Resources of Turkmenistan. O. Atagelgyev, state minister-chairman of State Concern Turkmengeologiya read the report; Minister Nazarov was in Islamabad on a state mission.

The report noted the adoption by Turkmen president Saparmurat Niyazov of a new Program of Geological Exploration Development for 2001-2002, which calls for purchasing modern geological and geophysical instruments and equipment. The entire drilling rig stock is to be replaced in the next few years, and the gas infrastructure as well as the Turkmenbashi and Seida oil refineries are to be modernized and reconstructed. The report also pointed to the need to modernize the active Turkmenistan-Europe trunk pipeline, which currently exports the bulk of Turkmen gas. Investment in the oil and gas sector will total approximately US$46 billion, with more than 75% of this investment to be provided by foreign partners. The inflow of foreign investment and technology will strengthen Turkmenistan's position in both existing and prospective oil and gas markets.

In his presentation, H. Babayev, chairman of the State Enterprise for Issues Related to the Caspian Sea, reviewed the Program of Oil and Gas Resources Development in the Turkmen Sector of the Caspian Sea, and outlined prospects and priorities in this crucial sector. The Caspian sector is estimated to harbor 11 billion tons of oil and 5.54 trillion cubic meters of gas.

Exhaustive information on the status of, prospects for, and priorities regarding introducing modern technology, equipment, and field services in the context of Turkmenistan's oil and gas complex development was provided to roundtable participants by the heads of State Concerns Turkmenneft (S. Valiyev) , State Corporation Turkmengeologiya (O. Atageldyev), State Trade Corporation Turkmenneftegaz (I. Charyev), Minister of Energy and Industry (A. Dzhumagylyzhov), and other top energy executives. Foreign service companies' modern prospecting, exploration, and drilling technology is likely to prove valuable in hydrocarbons exploration and production, oil and gas recovery enhancement, oil refining and gas processing, the development of gas chemistry, and supplying drilling platforms and pipe-laying ships in the Turkmen sector of the Caspian Sea and onshore. Turkmenistan was represented at the roundtable by more than 120 participants.

The delegates and the press also noted presentations by G. Skidanov, vice president of ITERA Group; R. Blay, vice president, development, Shell International, who outlined his company's experience in the field services sector development; Zian Xianlan, vice president of CPTDC; M. Gavrilenko, vice president of Volgaburmash; and other speakers.

The business-like environment and specific, factual nature of the presentation enabled roundtable participants to exchange views on all relevant issues. Officials of international companies operating in Turkmenistan noted that a lot has been done and is being done in the country to make its investment climate even more attractive to foreign partners. This observation was reiterated in the presentations by officials representing Petronas, ITERA, Mitro International, Burren Energy, Dragon Oil, and Schlumberger.

The roundtable also became the scene of numerous business discussions and negotiations whose participants pointed to the usefulness of events of this kind for advancing mutually beneficial cooperation and for maintaining working contacts between representatives of Turkmenistan's government agencies and companies from various countries. The delegates unequivocally supported the idea of turning the roundtable into a regular event.

As a follow-up to the roundtable, an international annual oil and gas Conference and Exhibition will be held December 16-18, offering interested companies an opportunity to present and demonstrate their technologies and equipment, and to propose specific steps toward broader cooperation. Information about the upcoming conference and exhibition will be provided shortly. ■

The 2002 Turkmenistan Oil and Gas Development Program

Saparmurat Turkmenbashi, the president of Turkmenistan, has issued a resolution approving the nation's 2002 oil and gas and mineral resources development program. This program is aimed at accomplishing the goals established for the national oil and gas complex in the 21st century - the Golden Century of the Turkmen people - in compliance with the president's "Strategy for Social and Economic Transformations in Turkmenistan for the Period to 2010" and with the "Program for Development of the Turkmenistan Oil and Gas Industry from 2000 to 2010."

In order to develop an analytical basis for oil and gas science and to introduce new technologies to, the same resolution envisages 2002 target financing for the Turkmenneft state concern's Balkan scientific research and design oil institute, Turkmengas state concern's Oil and Gas Institute, and the Turkmengeologia state corporation's scientific research geological survey institute. The funds would be used to purchase new equipment, instruments, and materials.

The program has set targets for the following sectors.

Prospecting and Exploration

As part of this program, geologists in Turkmenistan will assess localized hydrocarbon resources, prepare new, highly promising areas for deep exploration drilling, and prepare explored oil and gas reserves to further consolidate the nation's oil and gas resource base.

Prospecting and exploration through field geophysical and drilling projects will be carried out in the promising western Turkmenistan territories of Gerchek, Gunbatar-Ekerem, Adjayp, Garabogaz, and Garadashly. Deposits studied will range from the Paleogenic to the Paleozoic.

In central and northern Turkmenistan, projects will be carried out in Kyrklar, Vas, Mydar, Garadjaovlak, and Soltan Sandjar, where oil-bearing prospects are associated with deposits from the Cretaceous to the Carboniferous period.

In the Murgab gas and oil bearing province, projects are slated for Tagtabazar, Gurrukbil-Tek-Tek, Shatlyk-II, Oguzkhan, Bayramaly-II, and Tejen-II.

The quest for gas fields rich in condensate will continue through exploration and prospecting projects in Altyn Asyr, Yashyldepe, and Sagkenar - I, -II, and -III at the right bank of the Amu-Darya River. Exploration and prospecting will also continue in the Shatlyk-sandstone-to-salt replacement zone within Malai-Bagadja.

Study of the southeast section of the Repetek-Kelif zone will begin with a survey of the sediment, Pre-Jurassic complex inclusive.

In 2002, state-run Turkmen enterprises plan to complete 4,050 running kilometers of 2D seismic survey and 600 square kilometers of 3D survey. Gravimetric survey will cover 700 square kilometers. In total, nine new promising structures will be prepared for drilling.

Exploration and prospecting drilling are projected to total up to 133,000 meters in 2002. Incremental increases in hydrocarbon reserves will result in 71 million tons of conventional fuel. In addition, international companies operating under production sharing agreements project 15 million tons of incremental reserves of conventional fuel.

Oil Industry

In 2002, Turkmenistan's oil production under the program, including gas condensate, will total 13.5 million tons.

To increase production, including gas condensate output, the program calls for significantly increases in exploration and development drilling of oil wells and extensive investment in the scheduled projects.

In 2002, plans call for drilling 53,000 meters of exploration wells, as well as for drilling and commissioning development oil wells up to a total of 106,000 meters, utilizing currently available drilling equipment. Retained service drilling companies are also to drill 91,000 meters of oil wells.

If preliminary recoverable reserves at the Nebitlidje field are discovered and confirmed, 43,200 meters of development wells will need to be drilled, requiring an estimated investment of 146.9 billion Manats.

To achieve the drilling objectives, materials and technical resources will be needed for available drilling units. In addition, plans call for the purchase of drilling units and establishment of new field and geophysical teams.

SC Turkmenneft plans to increase oil production through:

— application of drilling technologies such as inclined directional, horizontal, and multiple bottom hole wells and implementation of simultaneous cum separate operation (SSO) at the developed and new fields at Goturdepe, Barsagelmes, Gogerendag, Corpedje, Keymir, Akpatlavuk, South Gamyshlydja, and Nebitlidje;

— recommissioning idle oil wells;

— workover, including introduction of new technologies (deep penetrating perforators, hydrofracs, side tracking, elimination of flow string defects and water shutoff, etc.);

— underground repair of wells;

— introduction of artificial-lift oil well operation, including high-pressure gas-lift, air-lift operation, and deep pump oil production;

— installation of SSO equipment;

— repairs of sandy wells at Goturdepe field by the China Petroleum Engineering and Construction Company (CPECC);

— stimulation of oil production from Gumdag field formations utilizing the services of the China's CNODC.

To further increase the resource base and oil production in 2002, investment is anticipated from oil companies operating in Turkmenistan, such as Monument (UK), Dragon Oil (UAE), and Mitro International Ltd., and retaining foreign service companies.

Gas Industry

The 2002 program envisages production of 67.8 million cubic meters of natural and associated gas subject to the gas volume contracted for supply to the Ukraine and the Islamic Republic of Iran and to the gas consumed within Turkmenistan. Planned gas production will be secured by the Turkmengas and Turkmenneft state concerns as well as by Turkmengeologia. Gas production figures break down as follows.

1. Total SC Turkmengas gas production: 57.1 million cubic meters, including 45 million cubic meters to be exported;

2. Total SC Turkmenneft gas production: 10.7 million cubic meters, including 8.5 million cubic meters to be exported, with exports to the Islamic Republic of Iran accounting for 6.5 million cubic meters;

3. Total SC Turkmengeologia gas production: 55.0 million cubic meters for domestic consumption. Gas pro-

duction volumes for 2002 are to be obtained and production facilities expanded and through the following activities:

a) SC Turkmengas:

— construction and commissioning of the Gagarin and Balgyiy fields and drilling new development wells;

— additional connection of wells at operated the Malay, Dovletabat, Garashsyzlygyn 10 yillypy, Yogyiy, and Chartake fields.

— rebuilding of the existing Turkmenistan (Bekdash)-Europe gas pipeline system including reconstruction of 20 kilometers of the Turkmenistan (Bekdash)-Europe gas pipeline and the Belek compressor station through construction of a gas pipeline bypass, facilitating gas transportation in the north-bound direction and stable supply for rising gas exports ;

— construction and commissioning of the CS Yilanly line and reconstruction of DCS West Shatlyk;

— construction of a new gas compression facility at units GPA - Ts 6.3, M=18.9 MW at Naiyp and construction of an additional separation line at the combined gas treatment plant (UKPG-5) at Dovletabat field;

— construction of a new gas liquefaction installation with daily capacity of 9 million cubic meters at the Naiyp field;

— construction of development fields with a total of 63,000 running meters;

b) SC Turkmenneft:

— commissioning new gas wells at the Corpedje field;

— workover of wells operated by Gumdagneft, Corpedje GPU, and Keymir, including introduction of simultaneous cum separate operation (SSO);

— construction and commissioning of a main gas pipeline from South Gamyshlydja to Corpedje;

— construction and commissioning of a high-pressure gas pipeline from Akpatlavuk to Keymir.

c) SC Turkmengeologia:

— development of the Gulzar field and further expansion of the Tagtabazar-I field's production facilities.

Oil Processing Industry

In 2002, plans are to process 7.7 million tons of oil with gas condensate, 5.6 million of which are to be processed by the Turkmenbashi Oil Refinery, and 2.1 million tons to be processed by the Seidy Oil Refinery.

Petroleum product production in 2002 is estimated as follows (see table)

The reconstruction of the ELOU - AVT - 6 and catalytic reforming LCH-35/11 - 1000H installations at the Seidy Oil Refinery is also planned for 2002.

Additional projects slated for 2002 include:

— Construction of a 26.4 megawatt gas turbine plant (GTU) and reconstruction retarded cocking plant at the Turkmenbashi Oil Refinery.

— Reconstruction by foreign contractors of other facilities at the Turkmenbashi Oil Refinery, representing an annual investment of US$ 80.565 million.

— Launch of the Yashyldepe - Seidy OR oil pipeline construction project.

PETROLEUM PRODUCT PRODUCTION IN 2002
(in thousands of tons)

automobile gasoline - total	1,458
including:	
AI-95	300
AI-76	1,158
Straight-run gasoline	504
Diesel fuel - total	2,067.3
including exports	1,417.3
Fuel oil - total	2,092.9
including exports	2,022.9

Investment Program

In 2002, more than US$1.88 million in investment is expected from the oil and gas sector. Turkmen investment will represent 53.4% of the total, loans will provide 33.3%, and foreign investment is expected to account for 13.3%. Foreign loans are likely to be used primarily for production construction and allocated as follows:

— gas industry — 81.3%
— oil industry — 15.1%
— oil processing industry — 3.6%

In the gas industry, foreign loans will be used to design and construct gas and chemical combined facilities at Gasodjak and to reconstruct automation and control system at HS-2 at Dovletabat-3 field.

In the oil industry, foreign credit will be applied to resume electric drilling and to further develop inclined directional and horizontal well construction as well as to develop a digital tracking communications network based on Tetrapol technology.

In the oil processing industry, foreign credit financing will be used to reconstruct the Seidy Oil Refinery.

In the non-production sector, foreign credit will be used to construct seawater desalinization facilities at Turkmenbashi and Khazar.

More than US$ 250 million is to be invested in 2002 within the framework of previously concluded production sharing agreements.

Most of the investment is will come from the oil and gas industry itself, and will finance construction and commission of the South Kamyshlydja, Keymir, and Akpatlavuk oil fields; construction and commission of a high-pressure gas pipeline from Akpatlavuk to Keymir; and continued exploration and development of the Nebitlidje, Shatut, and Gerchek structures.

T o ensure reliable export gas transportation, the construction and commissioning of the following facilities is planned for 2002.

— 121.9 kilometer bypass gas pipeline to complement the Turkmenistan (Deryalyk)-Europe pipeline system;

— A line compressor station at Yilanly.

To increase the amount of liquefied gas supply for export, construction of a new 60,000-ton annual capacity gas liquefaction installation is planned at the Naiyp field.

New construction will lead the structure (see diagram) of capital investment in production facilities, utilizing 64.6% of the available funds. Technical retooling of existing facilities will utilize an estimate 21.7% of the funds. Reconstruction and maintenance of operating facilities is expected to account for 13.7%. ■

INVESTMENT STRUCTURE

Agreement

between the governments of Turkmenistan and Afghanistan and the government of Islamic Republic of Pakistan on the project of gas main and oil pipeline Turkmenian-Afghanistan-Pakistan

The Government of Turkmenistan (the Turkmen side), the Afghan Government (the Afghan side) and the Government of the Islamic Republic of Pakistan (the Pakistani side), which are later in the text is referred as a Sides, taking into consideration the cultural ties and common interests, and aspiration of the Sides to strengthen friendly relations among the Sides regarding the projects on oil and gas pipelines;

Taking into consideration the interest of the sides:

— in construction and exploitation of gas main by the Consortium for delivery of natural gas from Turmenistan to Pakistan via the territory of Afghanistan and

— in elaboration of the pre-feasibility study of construction of the main by the union (later on referred as Consultant);

the Sides agreed:

Article 1

The Sides support the construction of Turkmenistan-Afghanistan-Pakistan gas main, consider it as meeting the vital interests of peoples, leaving in the region, and will coordinate joint activity, necessary for the supply, transportation and utilization of Turkmen natural gas.

Article 2

On the first stage, before the pre-feasibility study of Turkmenistan-Afghanistan-Pakistan and will be the first main phase of the project. Later the opportunity for laying the gas main to the third state or states (the second phase) will be discussed.

Pakistan comes forward as a link, guaranteeing regular transit of natural gas to the third states and will receive fee for gas transit co-agreed between Turkmen and Pakistani Sides. Pakistan will have a right to buy gas for domestic use or to pump its gas in case if it has additional capacities.

The Afghan Side will provide unimpeded transit of Turkmen natural gas from Turkmenistan to Pakistan and will get fee for transit of gas mutually agreed by Turkmen and Afghani Sides or other accords agreed by proper sides.

Article 3

The Sides agreed to reform a committee, headed by the Ministry of Mining Industry of Afghanistan from the Afghan Side, the Ministry of Oil and Gas of the Islamic Republic of Pakistan from the Pakistani Side and the Ministry of Oil and Gas Industry and Mineral Resources of Turkmenistan consisting of three representatives of each of the Sides. They are to observe the process of pre-feasibility study and consultations with each others on first and second stages of the project.

Article 4

The committee will research possible construction of highway and railway, as well as electric supply lines and optic-fiber connection among the three states.

Article 5

The sides agreed to choose a Consultant for elaboration of pre-feasibility study due to international tender. Financing of the works will be carried out by international financial institutes.

Article 6

The Sides will render assistance and will provide to Consultant data and technical information, necessary for pre-feasibility study; The Turkmen Side will play the leading role and inform the Sides on all stages of researches and consult with Pakistan and Afghanistan;

Article 7

As a part of this researches, Consultant can also study the possible implementation of the project of oil pipeline from Turkmenistan to Dvadar (Pakistan) via the territory of Afghanistan.

Article 8

Pre-feasibility study will be a basis for elaboration of feasibility study and further inter-governmental agreements, such as

- Agreement on gas sale and purchase;
- Agreement with transit states;
- Agreement on gas pipeline;

and other proper agreements.

Article 9

The Sides express their support and will expert all efforts for attracting international Consortium, having an experience in implementation of such projects. The gas main will be constructed and will belong and be exploited by the international Consortium.

Article 10

The Sides agreed that Afghanistan has a right of access to Turkmenistan-Afghanistan-Pakistan gas main for exporting its natural gas, as well as for gas supply from this system for the domestic use of Afghanistan. The volume of exported and received gas for Afghanistan will be accorded among the Sides based on the results of pre-feasibility study.

Article 11

The Sides guarantee the security of the gas main passing through their territory. The Sides realizes the role of adoption of International convention and other proper international-legal instruments under the aegis of UN, giving security guarantees and development of pipeline system.

The Afghan side is obliged to make necessary researches on its territory based on the results of pre-feasibility study for finding mines, ammunition and other explosive devices, which were not exploded. The Sides will undertake all necessary measures for providing security of entire foreign personnel, which will be on its territory as of the implementation of works on the gas main project.

Article 12

Any changes or amendments to this Agreement, relating to the Gas pipeline will be fixed in a separate tripartite Protocol, signed by the Sides and be an integral part of this Agreement.

Article 13

As for the comments and disputes over this Agreement they should be settled due to negotiations and consultations between the Sides.

Article 14

This Agreement will come into force after the Sides come to accord regarding the procedure. This Agreement will act within three years and may be prolonged based on written agreement of the Sides six months prior to the termination of the Agreement.

(The Agreement is signed by Saparmurat Niyazov - from the Turkmen Government, Hamid Karzay - from the Government of Afghanistan, Pervez Musharaf - from the Government of Pakistan)

May 30, 2002. Islamabad. ■

New Emphasis for Oil and Gas Policy Set at Roundtable: Business Opportunities in Modern Technologies, Equipment, and Services

Business Opportunities in Modern Technologies, Equipment, and Services, a roundtable on the oil and gas sector featuring Turkmenistan government officials, was held in Ashgabat, May 28-29, 2002. The roundtable was organized by the Ministry of Oil and Gas Industry and Mineral Resources, and RPI, Inc., a consultant to the ministry. At the opening ceremony, an address by Turkmen president Saparmurat Niyazov was read to delegates.

ADDRESS OF THE PRESIDENT OF TURKMENISTAN SAPARMURAT TURKMENBASHI TO THE DELEGATES OF THE FORUM "OIL AND GAS INDUSTRY OF TURKMENISTAN: BUSINESS COOPERATION OPPORTUNITIES IN THE SPHERE OF MODERN TECHNOLOGIES, EQUIPMENT AND SERVICES"

Dear ladies and Gentlemen! Dear delegates of the Round Table!

The Forum "Oil and Gas Industry of Turkmenistan: Business Cooperation Opportunities in the Sphere of Modern Technologies, Equipment and Services" is convened at the time of the 10th anniversary of the Constitution of the independent Turkmenistan that has formed a solid basis for a democratic law state with socially oriented market economy.

Ten years of independence became the years of resurrection for our national spirit, our millenium history and the richest culture, the years of economy formation, giving birth to new industries and revelation of the inexhaustible potential of our industrious and talented people. Having become the owner of its own destiny Turkmen people has proven its readiness and ability to solve most ambitious and sophisticated problems of the social and economic development striving to attain the big goal - turning its independent Motherland into a highly developed and prospering nation. Nonetheless important is how we as people managed to preserve our unique features, managed to maintain and develop traditions inherited from our ancestors, managed to realize our unique role and place in the modern civilization. The everlasting values, humanitarian outlook and most noble aspirations of our people had the quintessence in the holy book "Rukhnama" destined to be the spiritual guidance for many generations of Turkmen. I am confident that only people with fair intentions and high ideals can cope with the tasks of transforming the country and creating a solid basis for development and progress.

Dear delegates,

Paying great attention to the oil and gas industry as a leading industry of the economy the Government of Turkmenistan has a close focus on further development and integration of Turkmen fuel and energy complex into the world energy system.

Exploration, development, production, processing and sale of hydrocarbon resources that are plenty in the bowels of Turkmenistan have big specific weight in the gross national product consumes significant investment flow in the national economy and secures a good deal of employment of economically active population in the country. Development of oil and gas industry has had a decisive impact on the general directions and development dynamics of the entire national economy.

The Government of Turkmenistan clearly sees the need for further strengthening of foreign economic relations of national oil and gas enterprises aimed at increasing efficiency of their operations and investment and financial activities. This Round Table is planned to be a major step in this direction. Quality and scope of retained imported technologies and equipment may significantly affect the final parameters to assess oil and gas industry performance, the principal being solution of the tasks set forth by the Strategy of social and economic transformations in the country for the period till 2010.

Dear Ladies and Gentlemen,

Year after the year national oil and gas fields operators, oil refineries and service companies are increasing investment in capital assets and other items of operating fixed assets, thus strengthening material, technical and technological basis of production. Priority fields for investment remain capital assets in geological survey, implementation of new quality methods of onshore oil and gas production, development of the Caspian shelf, modernization of processing facilities, renovation and development of production infrastructure, including pipeline infrastructure. The Government of Turkmenistan will provide for all conditions capable of boosting cooperation with foreign companies within the scope of activities to attain the above priorities. We are ready for most innovative and large scale cooperation formats taking into consideration the interests of all parties concerned. In this connection I can't help mentioning the leader of the oil industry in Turkmenistan. That is Turkmenbashi integrated oil refining and processing facility. The first US$1.5 billion worth stage of modernization made possible to considerably

increase the depth of processing of hydrocarbon resources and master production of new products and expand export capabilities of the country. Unique modernization financing package assisted by big banking capital is the evidence of growing confidence of Western creditors in the investment processes in Turkmenistan.

Turkmenistan will proceed with developing onshore oil and gas fields with its own force and means retaining service companies who have new technologies and oil and gas techniques and equipment on tender basis to optimize service costs.

Oil and gas complex in Turkmenistan has big potential for further growth. The issues to be discussed at this meeting and the exchange of experience will contribute to the foundation of accelerated mutually beneficial cooperation in the sphere of increased production and processing of hydrocarbon resources to the benefit of the Turkmen people as well as all companies concerned. Cooperation forms will sure be specified at the forthcoming VII International Oil and Gas Conference in December this year.

Dear guests, Dear Ladies and Gentlemen,

Peace and accord reigning here, wisdom and diligence of the Turkmen people has always been and will be the most precious riches of Turkmenistan. This is the main guarantee of our consolidated achievements along the long way for mutually beneficial development of hydrocarbon resources. To wind up I would like to express my confidence of this Round Table becoming yet another forum to demonstrate the spirit of partnership that has been forged in business contacts between Turkmen organizations and foreign companies and consolidating the foundation for beneficial cooperation in the sphere of oil and gas.

Welcome to Turkmenistan in the Golden Age of the Turkmen people! I wish you a successful and fruitful work

SAPARMURAT TURKMENBASHI
PRESIDENT OF TURKMENISTAN ■

In his opening address, the vice chairman of the Cabinet of Ministers of Turkmenistan, Elly Gurbanmuradov, discussed the oil and gas industry's new development phase and the state's new approach to regulating the industry, which implies gradually abandoning business functions, securing high transparency of industry processes, and setting conditions for equal competition between domestic and foreign companies.

NATIONAL POLICY PURSUED BY TURKMENISTAN TO ENCOURAGE FOREIGN INVESTMENTS TO OIL AND GAS INDUSTRY

Dear Ladies and Gentlemen,

It is a great pleasure and big honor for me on behalf of the President of Turkmenistan, the Great Saparmurat Turkmenbashi, to welcome today the participants of the Round Table devoted to the prospects of cooperation in the field of technologies, equipment and service work in the oil and gas industry.

Many of those present today are our old partners in oil and gas projects and people well familiar with the business climate in Turkmenistan. Others are to know the opportunities related to developing our hydrocarbon potential. To this end, opening the discussions I would like first of all to thank you all for the continued interest for Turkmenistan and those practical efforts towards cooperation in the oil and gas industry.

We appreciate your readiness to attend the Round Table. Such constructive approach is genuinely unique considering that we meet late in May when business planning tasks are runner-ups on the priority lists after summer vacation planning, when the Bahamas and Riviera are the words on the tip of the tongue rather than the geographic locations of Turkmenistan. Well, anyway you are welcome!

The last time we had a major forum discussing Turkmenistan hydrocarbon resources development issues was last fall when on the eve of the 10th independence anniversary traditional TIOGE conference was staged. Seven months have gone since then. The months that were full enough with major events in the global energy industry. Certain tendencies of economic growth cropped out entailing growing demand for energy resources in industrial developed countries. World oil and gas prices have stabilized, though at a lower level. Leaders of the European Union have taken a series of important measures to liberalize gas market. Enron's bankruptcy demonstrated the need to search for additional mechanisms to secure stability of energy companies.

Against this background energy markets development in this region, namely in Turkmenistan, was also rich in events. We are glad to state that oil and gas complex in Turkmenistan had plenty of positive events and indicators of stable growth. By the end of 2001 oil and gas production had reached a record mark. New installations were commissioned at Turkmenbashi Refinery. Discussions of the prospects of Trans-Afghanistan gas pipeline to Pakistan and India were resumed. Finally, owing to the initiative and the efforts of our President Saparmurat Turkmenbashi Ashghabat hosted the first Caspian Summit. In this context we would like to consider in cooperation with you the impact of global and regional industry tendencies on Turkmenistan oil and gas complex development and to assess the prospects to realize specific projects.

Dear guests,

Oil and gas complex in Turkmenistan is the creation of the President of our nation, the Great Saparmurat Turkmenbashi. Owing to his management, continuous attention paid to the industry's needs, clearly set development targets over the years of independence Turkmenistan has achieved significant successes in safeguarding national energy security and integrating into world economy.

Today, after gas supply is available throughout the entire territory of Turkmenistan it is hard to imagine that only 10 years ago this country, the leading gas supplier for Central and Eastern Europe, had overwhelming majority of its cities and villages without gas supply. The population used firewood (!) to heat their houses. After commissioning Turkmenbashi Refinery our country feels proud that those times have gone when million tons per year oil producer imported (!) lubricating oil and high quality gasoline. I would like to stress once again that the success of such magnitude could hardly be achieved without the management of our President.

After the initial stage of independent energy sector formation in Turkmenistan we face much more important and complicated tasks. The work aimed at securing national energy independence being continued one should make the most of the favorable universal tendencies to consolidate the standing in the old and emerging oil and gas markets. Besides, development of oil and gas processing facilities not only helps saturate the home market but sets forth new tasks to export the produce with higher value added as well. Finally, the priority of deepening cooperation of national

and foreign partners is becoming more urging to have modern industrial technologies and advanced management practices efficiently implemented.

Considering all the above we realize that the success of this new phase of industry development is based mainly on the rule of law and allocation of state regulating functions over oil and gas complex to the government, transparent economic processes and laws. With business functions surrendered by the government we will have not only all industry processes transparent but equal competition opportunities to all as well thus consolidating the basis for stable development of oil and gas complex in Turkmenistan.

So, Turkmenistan oil and gas concerns and corporations have to act as oil contractors independent of the state enjoying equal rights and obligations with foreign contractors under the law "On hydrocarbon resources". We are confident that independent of the state national corporations upon consolidating their competitiveness and based on excellent knowledge of regional conditions will start to act more regularly as operators under production sharing agreements concluded between the government and foreign consortiums. The long-term priority of the state as the principal shareholder in national corporations plays the role of shareholding capital yeast for the state-run corporations through mastering new forms of management, improved corporate management practices and divestiture operations.

Dear Ladies and Gentlemen,

Increased transparency of relations between the government and oil contractors will have to open nonetheless interesting opportunities for national and international companies in the sphere of service works for oil and gas industry being the main topic of his Round Table. The process of acquiring the status of independent oil contractors by state-run corporation is closely connected with their transformation into vertically integrated companies thus rendering autonomy of operation for national oil ad gas service companies. It is this sphere, including supply of equipment, geophysical works, workover and implementation of advanced gas and oil processing technologies, that has the best prospects for cooperation in the years to come. We hope that improving business climate in the oil and gas industry will have a significant impact on growing private business initiative, formation of joint ventures and affiliated structures between national and foreign service companies. In its turn efficient development of oil and gas services will create the basis to advance technologies of prospecting and exploration, production and processing and overall growth of economic efficiency of the industry and growing revenues by oil contractors. It should be noted that the legal basis formed by now permits to secure tender transparency and equal competition environment for contracting oil and gas service works.

Mutually beneficial cooperation of national and foreign companies in the sphere of processing and distribution of energy resources is of great importance too. A vivid example of success achieved in this sphere is Turkmenbashi Refinery. Oil and gas industry and the entire people of Turkmenistan is infinitely grateful to the Great Saparmurat Turkmenbashi for construction and commissioning of this Refinery. Our honored President not in the least weakening attention to the industry has set new task to modernize Seidy Refinery and construct modern natural gas liquefaction and chemical processing facilities. To solve the tasks active cooperation with foreign partners is required to introduce modern equipment and technologies and to train national personnel.

Finally, jointly with foreign partners we are in for a big job to develop a gigantic gas exportation infrastructure to supply gas from Turkmenistan to regional markets. Above mentioned Trans-Afghanistan gas pipeline project becomes a reality to be implemented in phases owing to the Great Saparmurat Turkmenbashi. Penetration to the markets in Turkey and South Europe via Trans-Iranian and Trans-Caspian gas pipelines remain topical same as construction of Trans-China gas pipeline offering an outlet to the Far East markets. Besides, time offers new challenges of modernizing Turkmenistan-Europe gas pipeline, currently the main pipeline passing across Central Asian countries and Russia. We are confident that the interest and active involvement in these projects by international industry through supplies of equipment and cooperation management schemes will become another sphere of long-term and mutually beneficial cooperation.

Dear delegates of the Round Table,

Turkmenistan and its partners are to make a long way to transform these vistas to concrete plans and implement this new stage of oil and gas complex development. Our main advantage is the wise leadership of the Great Saparmurat Turkmenbashi who is the founder not only of the power industry of Turkmenistan but such favorable development environment as home stability and growing national authority in the international arena as well.

We have no doubts that further strengthening of the supremacy of law, greater transparency of cooperation and deepening constructive dialogue with foreign partners will bring about oil and gas complex of Turkmenistan to new heights. In this context this Round table is seen as an important step forward along the road of discussing development directions and prospects, searching for and formation of new forms and methods of cooperation.

During these two days you will hear detailed and interesting papers prepared by officials representing the government, Turkmenistan oil and gas companies as well as foreign companies having rich business experience of operations in our country. Besides, all Turkmenistan's officials are open to negotiations with foreign guests and discussions on concrete projects outside the framework of the forum. For us it is the practical results of these two days of meetings, new opportunities of cooperation identified, synchronization of views and aspirations that matter. I wish you all success.

Thank you for attention. ■

Kurbannazar Nazarov, minister of oil and gas industry and mineral resources, offered details of the oil and gas sector's development results in 2001, the industry's technological and market potential, prospects for developing equipment and services markets, and ways to further develop the country's oil and gas resources.

POTENTIAL FOR THE USE OF MODERN TECHNOLOGIES, SERVICES AND EQUIPMENT IN THE TURKMEN OIL AND GAS SECTOR. FORMS OF CO-OPERATION WITH FOREIGN COMPANIES, AND FUNDING MECHANISMS

Turkmenistan's strategy for developing the country's oil and gas complex in the period to 2010 envisages creating the macroeconomic conditions needed for the sensible, prudent use of natural resources and the future development of the sector, conditions under which national companies will be gradually adapted to operate under market conditions.

Turkmenistan is one of the richest countries in the world in terms of future hydrocarbon resources - equivalent to 45.44 billion tonnes of notional fuel. Over the next five to seven years Turkmenistan intends to make a gigantic leap in terms of increasing exports of hydrocarbon raw materials and oil products for the world markets.

The Turkmenistan Programme of integrated social economic development of the country's oil and gas industry up to 2010 is based on proven reserves and potential hydrocarbon resources. The Programme envisages increasing production of hydrocarbons in 2005 to 28 million tonnes of oil and 85 billion cubic metres of gas. In 2010 the figures will rise to 48 million tonnes of oil and 120 bcm of gas.

Alongside this increase in production volumes we are planning to increase oil export volumes in 2005 to 16 million tonnes and gas exports to 70 billion cubic metres. In 2010 the figures for exports will be 33 million tonnes an 100 bcm of gas.

There will also be further developments of the gas refining and gas chemical industries. Oil refining capacity will be increased to 15 million tonnes per year with a corresponding increase in exports of refined oil products.

Achieving the levels of hydrocarbon production which have been planned will be directly linked to opening up promising areas and fields both onshore and offshore. This will be proceeded by integrated geological exploration work and development of the field.

At present the task faced by geologists and oil exploration teams in Turkmenistan is to evaluate localised reserves and to prepare new, highly promising areas for deep exploratory drilling. They will also be preparing proven oil and gas reserves in order to strengthen Turkmenistan's raw material base for future production of oil and gas.

The speedy resolution of the task of increasing production of hydrocarbons is closely linked to the use of modern technologies and equipment which have been tested in world practice. This will be used for geophysical and exploratory work, as well as for drilling on promising areas and fields, and in developing and producing hydrocarbons, intensification of oil and gas output at existing fields, and capital repairs on wells.

The use of experience accumulated by foreign companies through the introduction of modern technologies which are appropriate for conditions in Turkmenistan, and the provision of services and supply of equipment, will allow us to increase the efficiency of work done by the sector.

Prospecting and exploration

In the area of oil and gas prospecting and exploration Turkmenistan has adopted an unwavering policy of introducing modern equipment and high technology methods into prospecting and exploration work. When a structure is being prepared for intensive exploratory drilling we pay particular attention to 3D seismic exploration, which is a highly effective research method.

In 2000-2001 3D studies were carried out in the promising territory at Altin Asir on the right bank of the Amudariya river. This study allowed us to clarify the geological model of the structure of productive carbonaceous deposits in the upper Jurassic areas of this territory. Similar studies have also been undertaken at fields at Western Turkmenistan: Gamishlidzha, Southern Gamishlidzha, Korpedzhe, Akpatlavuk, Chekichler. The materials generated by these studies are currently being processed and interpreted.

The work on introducing 3D seismic exploration is being carried out with the active cooperation of the Western Geco company. In 2002, 3D field work will be undertaken jointly by Turkmengeologiia and Western Geco at the promising location Ekerem. This work will cover the offshore area of the Turkmen sector of the Caspian Sea, the transit zone between sea and dry land, and the coastal part of the onshore section of this territory. Joint processing and interpretation of these materials is taking place in Britain.

Another form of cooperation between companies is through supplies of high tech equipment used in the work which has just been described. When these contracts are signed they specify that Turkmen staff will be trained to work on this equipment.

One of the main tasks for geologists and exploration teams onshore in Turkmenistan and on the Caspian shelf is to find and prepare new large scale structures and zones, and possible oil and gas traps which can later on be studied using deep drilling methods. To achieve this vital aim, in 2001 Turkmenistan's President The Great Saparmurat Turkmenbashi approved the "Programme for developing geophysical work in Turkmenistan in 2001 - 2002".

This programme allocates funds to equip field teams and the industrial-geophysical services in Turkmenistan with modern apparatus and equipment. Basic promising areas have been set out where specific volumes of geophysical work will take place. The programme also envisages the active use of new technologies for intensive studies of sub-surface resources. This involves the use of qualitatively new logging systems with computer controlled management and the use of modern technology to process and interpret the data which is received.

Drilling work

In the drilling sector Turkmenistan has commercial contacts with equipment and technology suppliers from a range of foreign companies:

— with the Potentsial factory in Ukraine, for supplies of equipment used in sloped and horizontal drilling

— with the Neftegaztekhnologiia Inzhiniring company of Krasnodar (Russia), for supplies of equipment for branching a second core.

In 2002-2001 we acquired Chinese drilling rigs with electric and diesel drives, and we are continuing with supplies of mobile drilling rigs from the USA for work in rugged terrain. During drilling work at the Eastern Cheleken well local drilling personnel are being trained by a supervisor from Bentek (Germany).

Talks are underway with Cameron, Baker Hughes and Halliburton for supplies of drilling bits, as well as anti-blow out and other drilling equipment. Turkmen specialists are actively working with the Russian organisation Tvergeofizika, the Chinese National Oil Company, Schlumberger, Dynamite-Nobel, and Etekon on the supply and use of new computerised stations, highly efficient borers, new high precision units for electric, acoustic, induction laterolog and

microlaterolog radioactive and other types of logging and cable products.

We have begun testing Geoframe software for integrated interpretation. Talks are also underway on testing a new carbon-oxygen logging system on oil wells in Turkmenistan.

In order to increase production of natural gas at both new and long established fields, as well as in exploratory areas, we expect to see a large volume of exploitation and exploration drilling in order to maintain the required number of wells in operation and the necessary increase in reserves.

There was a total volume of 106,000 metres drilled in 2001 across Eastern Turkmenistan in these two categories of drilling. By 2005 this figure will rise to 229,000 metres, of which 85,000 metres will be exploitation drilling. In addition about 75 prospecting and exploration wells will be drilled in Western Turkmenistan at new and at long established fields.

In order to achieve the intended volume of work, in 2001 a programme of renewing the pool of drilling equipment in the oil and gas regions of Turkmenistan was initiated. So, for example, the plan is to take delivery of five ZG70D type drilling rigs from the Chinese Oil Company. These rigs allow for wells of between 6,000-7,000 metres in depth.

Experimental testing of Chinese and American produced drilling bits are currently under way and we are looking at the possibility of giving approval to drilling bits produced in other countries. The development of drilling operations in the future will be based primarily on the complete renewal of the pool of drilling equipment.

All of the operational gas wells have been drilled with vertical cores. However at fields where gas deposits are related to carboniferous formations it makes sense to drill wells using a horizontal core. So, for example, at the fields in Kerpichli, Gugortli, Northern Balguy and certain others carboniferous collectors have a large area and gas bearing level. In this case, as far as operational drilling is concerned, we need to introduce drilling technologies which will give a more balanced draining of the deposit and the maximum reduction in pressure sink.

This involves drilling large diameter wells and wells with horizontal cores. The introduction of these technologies will allow us to reduce the number of operational wells and will make the system for collecting gas simpler and less expensive. In the drilling sector we also need to use technologies which improve the construction of the well and give the maximum reduction in drilling time by using high quality drilling solutions and a range of drilling instruments.

Gas industry

Within the structure of the Turkmen oil and gas sector the dominant role is played by the gas industry. This sector has been subject to accelerated development and currently contributes very significantly to the economy of the state.

Gas production is carried out by the Turkmengaz and Turkmenneft state concerns. In 2001 across Turkmenistan as a whole gas production was 51.3 billion cubic metres. The annual increase in gas production over the last four years has been at an average rate of 10%.

This figure has been reached thanks to careful management of operations by gas production companies, by the creation of new gas production sites and the extension of existing ones, and thanks to the gradual introduction of the latest equipment and technologies into production operations.

Intensifying production and capital repair programmes

Alongside the introduction of new capacity in order to increase gas production we are working and will continue to work on introducing new gas production technologies, as well as intensive extraction of condensate, and capital repair programmes at gas wells. We are also intensifying gas production using a range of physical-chemical methods for impacting on the seam. In order to improve outcomes from capital repair of gas wells, the existing pool of machine tools have been updated, and new pieces of equipment have also been bought.

At present, in order to increase the yield of gas wells and in particular to ensure that the condensate which has accumulated at the face of the Kerpichli field can be extracted, we are working to improve the construction of underground pipes and to recondition the critical zone.

In waterlogged wells we are working to intensify the off-take of liquids with the help of both solid and liquid surfactants which are able to work under the conditions found at gas fields in Turkmenistan.

The programme of developing the oil and gas complex up to the year 2010 envisages a substantial volume of reconstruction, as well as construction of new facilities for:

— gas production
— gas condensate production
— improving gas quality
— transportation.

Considerable work had already been done in this area, re-building gas preparation units. This means we have increased the level of hydrogen sulphide removal, and cut back on the amount of reagents used in absorption based natural gas dehydration units.

At the beginning of this year we commissioned a unit to prepare and compress gas at the Dovletabad field. This has production capacity of 54 million cubic metres per day. The project uses units produced by the Dresser Rand company (USA) and Turbo Expanders from the Mafi Trench company (USA), as well as air cooling units which reflect the latest scientific and technical achievements in this area, and which ensure the efficient and reliable working of the unit.

We are also working on building a liquid gas unit at Naiyp, and re-building the compressor stations at Iylandly and Derialyk.

The following technologies will be used in the production and transportation of gas:

— Underground technologies which optimise management of the movement of fluids (gas forming and liquid hydrocarbons) in the seam and the efficient use of the energy in the seam. To achieve this requires the latest technologies and methods for the dynamic and statistical modelling of the seam.

— Well technologies which use the optimum methods for the operation of wells which have heavy water seepage and low seam pressures. Also technologies for isolating water inflows, for impacting on the critical zone of the seam in order to improve the fluid conductivity of the critical zone of the well. Technologies for hydraulic fracturing of the seam.

— Underground technologies designed to improve the management of production processes linked to the production and preparation of gas. Technologies which will reduce costs at gas production facilities. The use of compressors with high output ratios and compression ratings.

— Technologies and scientific innovations which increase the proportion of market condensate which can be extracted and produced.

— Technologies and equipment designed to address the problem of diversifying the sales market for natural gas, and to reduce capital and operational costs in order to achieve maximum efficiency in the work of transportation and production companies, such as:

— high strength pipes for operations at high pressure, and compressors with high compression ratings, which will make it possible to reduce the number of compressor stations

— technologies for triple phase transportation of the fluids which are produced, in order to set up integrated centres for preparing and refining natural gas (with on site transportation of gas and oil).

Oil production

The main oil production region is in Western Turkmenistan where the Turkmenneft company undertakes exploratory works as well as development and oil production. Foreign companies also operate in this area - Petronas (Malaysia). Dragon Oil (UAE) offshore, and Burren Energy (Great Britain) and Maitro International (Panama) onshore.

In 2001 oil production and gas con-

densation production in Turkmenistan amounted to 8,019,300 tonnes. Turkmenneft's own production (excluding their share in PSA products) amounted to 6,821,600 tonnes.

Thanks to the introduction of modern technologies, Turkmenistan's oil men have been able to achieve an average increase in oil production of 12-14% per year. Planned work for 2002 is designed to reach an oil production level of 10 million tonnes, and this envisages;

— new wells into operation.

— Bringing into operation wells which have been mothballed.

— Capital repair of wells, using specific new technologies (deep penetration drilling, hydro fracturing of seams, side tracking the second core of the well, removing defects from operating columns, methods for intensifying oil production and water isolation, and other technologies).

— Use of sloped/directional drilling technologies and horizontal wells.

— Converting oil wells to mechanised methods of oil production.

The long term development of the oil and gas complex in western Turkmenistan will be through operating oil and gas fields which have been in production for a long period of time, and also by developing new areas and opening up highly promising territories.

The first group of fields require efficient use of resources and high levels of output from reserves. This will call for measures to focus on additional production, involving:

— the use of the most effective and economic methods available for more intensive use of wells, along with methods for raising oil yields from seams (secondary, tertiary and quaternary methods)

— carrying out water isolation and reinstatement work and opening up wells which currently mothballed

— improving the filtration-volume characteristics of complex structure deposits using hydraulic fracturing, acid processing, physical-chemical methods, as well as electrical and wave methods

— using helical, centrifugal and sucker pumps with up to date modifications, single-separate exploitation and other methods

— methods for preventing sand formation, wax deposits, salination, and so on

— reconstruction of oil and gas collection systems and other production infrastructure facilities.

At the second group of fields, increased oil production can be achieved using the following approaches:

— using new technologies for drilling operational wells which are planned in the new fields - Korpedzhe, South Gamyishlidzha, Eastern Cheleken, Keimir, and Akpatlavuk

— prospecting for hydrocarbon reserves in the mesoceme and miocene areas

— bringing into trial operation oil reservoirs in areas which have been explored - Shatut, Nebitlidzhe, Gerchek

— exploration for hydrocarbons and development of oil and gas reservoirs in the pliocene and mesozoic areas in the Garashsyzlyk

— exploration and bringing into operation oil and gas reservoirs in the Kyrk-Gyazlinsk group of fields.

In the third group of fields, prospecting and exploratory drilling for oil across a broad front on promising onshore areas gives grounds for expecting the discovery of new oil fields which would come into operation by 2010.

The increase in the raw material base and in oil production is planned to be centred on foreign investment by the companies currently working under PSAs - Petronas (Malaysia), Dragon Oil (UAE), Burren Resources Ltd (Great Britain), Maitro International Ltd (Panama). Significant increases in production are expected here after 2005, once the preparatory and evaluation work has been completed.

In the second stage, beginning from 2005, significant discoveries are expected in promising areas of the Turkmen shelf of the Caspian Sea and in the coastal strip.

Turkmen sector of the Caspian Sea

The opening up of the Turkmen sector of the Caspian Sea is planned to be mainly achieved by bringing in foreign companies and investors to implement the "Programme for licensing promising oil and gas blocs offshore", on the basis of PSAs. There is a pressing need for self-elevating drilling rigs which can work at sea depths of between 100-120 metres, as well as semi-submersible drilling rigs for work in promising blocs where the sea depth is more than 100 metres.

Carrying out oil work at sea also requires the development of pipe line and maritime transport infrastructure, the development and modernisation of port facilities and the development of a tanker fleet. That is why the role of foreign companies is important. They have access to the relevant technologies, equipment and experience of this type of work, and a wish to participate in implementing these projects.

Oil and gas refining

The Turkmenistan Oil and gas refining sector is fully able to meet the demand for refined products from within the country. With increased export potential Turkmenistan has well-developed plans to rebuild existing oil and gas refining and petrochemicals facilities, and to build new units. The idea here is that the sector should focus on integrated use of hydrocarbon resources in order to get the maximum yield from all the valuable components which are present.

The first stage of rebuilding the Turkmenbashi refinery is now nearing completion. New petrochemical and gas refining capacity is being created in the country which will increase the quality of oil products as well as increasing the proportion of refined oil products. And the infrastructure of the refining sector of the oil and gas complex in Turkmenistan is also being developed.

As a result of reconstruction of the Turkmenbashi refinery there has now been a complete re-equipment of the refinery with the use of modern resource saving equipment and technologies, and with the minimum level of environmental pollution, while at the same time ensuring output of products which correspond to world standards. By raising refining intensity to 90%, yield has been increased and new product categories are now being manufactured - lubricating oils and polypropylene.

The following companies took part in rebuilding the refinery: Technip (France), Itochu, GJC, Chioda, Nichimen (Japan), the Iranian National Oil Engineering and Construction Company, Gama (Turkey) and other companies. Financing for these projects was providing by a consortium of banks from Germany, the Eximbanks of Japan, Turkey and Malaysia, the Kofas Agency (France), the Ducrois agency (Belgium), and the Nichimen company (Japan).

Alongside the construction of new units at the refinery there is a wide scale modernisation programme underway on existing production units, using the most up to date technologies. For example the company Emerol Ltd (Ireland) has rebuilt the flare off unit at the Turkmenbashi refinery using a fundamentaly new technology - liquid gas stream units with automatic management systems produced by the Foxboro company. The result of this work is that there is now total extraction of gas condensate and petrol fractions, capturing 80% of degassing gases.

The same company also completed a project to modernise the VT/1 vacuum distillation unit with the use of an advance technology which creates a vacuum in the hydrocirculation unit. This raises the intensity of oil refining and increases the yield of refined products. It also reduces operational costs by saving on the amount of energy and thermal power used. Atmospheric emissions equivalent to 4 tonnes per day of furnace disintegration gases have been halted.

The total volume of investment in rebuilding the refinery, up to its complete reconstruction, is expected to be USD1.5 billion. The second phase of

reconstruction at the Turkmenbashi refinery involves introducing intensive diesel fuel de-sulphurisation, bringing output up to international quality standards and raising its competitiveness on world markets. To achieve this, a contract has been signed with Technip Germany to build a diesel fuel hydrofining unit under a turnkey project using modern technologies.

In addition, there are several projects currently underway, with foreign companies involved in the reconstruction of other units in the refinery and the construction of de-salting units, a gas turbine power station, and on-site terminal for the storage and sale of liquid gas, and several other projects.

A large scale reorientation of the existing production pattern in order to raise refining intensity is being planned for the near future at the Saidin refinery. More specifically, there is a tender underway for reconstruction of units to give a production capacity of 2 million tonnes of crude per year.

Gas refining and gas chemistry

In the gas refining and gas chemistry sectors work is underway to create a gas chemical complex at Gazachak to produce polyethylene, with production capacity of 200,000 tonnes per year. The companies involved are Marubeni and JGS (Japan) and Linde (Germany). There is also a project to build a gas refining plant and pipe line for purified gas based around the Samandepinsk group of hydrogen sulphide bearing fields, by the Lurgi company (Germany).

Liquefied gas

A great deal of attention is also being paid to the construction of units to produce liquid gas, which is a very profitable export product and raw material to be used in the future growth of polypropylene and polyethylene production. Alongside the existing units at the Turkmenbashi refinery and the Naiyp field, a contract has also been signed with the Thermo Design Engineering company (Canada). Work is underway on building a liquid gas unit at the Naiyp field with annual production capacity of 50,000 tonnes. Turkmenistan intends to raise production of liquid gas in the coming years to 500,000 tonnes per annum.

In order to meet the target which Turkmenistan has set itself for increased hydrocarbon production, the country is working with, and is ready to increase cooperation with, foreign companies which have access to modern technologies and equipment to carry out a large volume of geological and exploration work, drilling, developing production fields and preparing hydrocarbons for onward transportation both to the domestic market and to a greater extent for export.

The oil and gas sector represents more than 65% of industrial production in Turkmenistan. Bearing in mind the strategic importance of this sector for the economy of the country, the government is carrying out a whole range of measures to attract foreign investment into the country.

Laws have been passed "On foreign investments", "On investment activity", "On sub-surface resources in Turkmenistan", "On foreign concessions", "On the hydrocarbon resources in Turkmenistan". There is also a Decree of the Turkmen President "On procedures for issuing licences for the right to carry out oil work on Turkmenistan territory".

New administrative regulations have been brought in relating to the oil business. In December 2001, under a decree of the Turkmen President, new procedures have been drafted for offering and selling energy products for export. The sale of energy products by auction means there is now an open door policy.

The democratic nature of these auctions - with equal rights for all competitive players (brokers) - makes it possible to select the best offer in terms of price.

Turkmenistan is a member of the International Monetary Fund, the International Bank for Reconstruction and Development, the International Finance Corporation, the International Development Association, the Multilateral Investment Guarantee Agency, and the International Centre for Dispute Settlements with Investors.

In accordance with all the legislative acts mentioned above, foreign investments in Turkmenistan are given legal protection. They cannot be subject to nationalisation or requisition. Profits made by foreign investors, after taxes have been paid, remain at their disposition and can be reinvested in Turkmenistan.

Turkmenistan uses various forms of **cooperation with foreign companies**: based on standard contracts, joint enterprises and PSAs for the oil business, and joint activities in the business sector.

Financing for the work being done is carried out both through direct foreign investment, and through the provision of long term and medium term foreign credits. Offset financing is used by gas, oil and oil products suppliers for work done by subcontractors. The preferred form of financing is project based, when the payment for work done by foreign subcontractors is made in the form of output from the newly built facilities.

To achieve the intended levels of hydrocarbon production and exports to the world markets we expect to see a substantial growth in investment in the Turkmenistan oil and gas complex. In total over the period 2002-2010 we envisage an investment volume of up to USD46 billion. The proportion of direct investment by foreign companies will amount to 75% of the total, and the proportion of foreign credits - around 5%.

On the basis of foreign direct investment we are proposing to develop the priority area for increasing hydrocarbon production - the Turkmenistan shelf of the Caspian Sea, with the use of appropriate technologies and equipment, and the construction of oil and gas export pipelines.

Making full use of the resources of Turkmenistan's oil and gas complex, the plan is to open up the country's onshore oil and gas fields. In some cases this means working together with foreign companies on the construction and introduction of modern technologies and equipment used in geological and exploration work, drilling, well development, and production and transportation of hydrocarbons and refined products - both for the domestic market and for the international markets.

So there are great opportunities for foreign companies to take part in opening up the hydrocarbon resources of Turkmenistan. In the course of carrying out programmes to renovate, reconstruct and modernise, Turkmenistan is demonstrating its ability not only to attract investment, but also fully, precisely and in the agreed time frame to carry out its financial obligations in relation to investment and loans, which raises the country's rating as a reliable financial partner in investment projects.

Thank you for your attention. ■

Ilyas Charyev, chairman of STC Turkmenneftegas, focused on reconstruction and modernization of the Turkmenbashi and Seidy Oil Refineries, and principal routes, structure, and procedures to export hydrocarbons from Turkmenistan.

EXPERIENCE OF USING MODERN TECHNOLOGY AND EQUIPMENT IN OIL AND GAS REFINING, PETROCHEMICALS, BUILDING AND RECONSTRUCTING TRANSPORT INFRASTRUCTURE IN THE TURKMENISTAN OIL AND GAS SECTOR

It gives me great pleasure to greet the participants in this round table on the theme: "Oil and Gas Sector of Turkmenistan - Business Opportunities in Modern Technologies, Equipment and Services". First I would like to give you some brief information about the main aspects of the development of oil and gas refining, petrochemicals and transport infrastructure in the oil and gas sectors of Turkmenistan. These are among the fundamental sectors within the programme set out by the President of Turkmenistan the Great Sapamurat Turkmenbashi - "Strategy for Social and Economic Reform of Turkmenistan in the period to 2010".

In order to implement this programme, all the political, economic, legal preconditions are in place, as well as the neccessary resources - 12 billion tonnes of oil and 22.8 trillion cubic meters of gas. Legislation in Turkmenistan guarantees the safety of investments in the country.

My presentation consists of 2 parts:

— development of petrochemicals and gas chemical production, based on reconstruction of the Turkmenbashi and Saidin refineries.

— integrated development of systems for transporting, storing, transshipping and exporting oil, gas and refined products.

1. Refining and petrochemicals

We have two refineries: Turkmenbashi and Seidy. Production capacity at each of these sites in terms of primary oil refining is 6 million tonnes per year. This represents 5% of the oil capacity of the CIS, or 0.36% of world oil refining capacity. The Turkmenbashi refinery was opened in 1943, the Seidy refinery in 1991.

The Seidy refinery is a new facility with a developed infrastructure. However, because it does not have a continuous source of hydrocarbon raw material in sufficient quantity (at least 4 million tonnes per year) the refinery is operated according to a cyclical scheme: accumulation of raw material-refining-accumulation. Most of the hydrocarbon raw material which is refined here, about 80%, is Kokdumalak crude with 2% sulphur content, and Kokdumalak gas condensate with 0.85% sulphur content.

The range of output includes straight run petrol, diesel fuel and fuel oil. The imbalance between design capacity and actual refined volume, as well as the higher sulphur content, means it is not possible to generate high quality oil products, nor to ensure uninterrupted work in the refinery, which would require substantial change to the existing refinery pattern.

The main element in the reconstruction programme at Seidy will be to add bitumen production to the existing complex, a diesel fuel hydrofining unit, and a unit to generate extraction solvent. To achieve this we are planning to use highly efficient Western technologies and equipment, as well as modern process management systems. We plan to carry out this reconstruction on the basis of project financing, using foreign investment, once we have secured guaranteed supplies of hydrocarbons to be processed for a fee, more than 2 million tonnes per year.

The Turkmenbashi refinery is one of the oldest industrial enterprises in Turkmenistan, and it has a wide range of production units for both primary and secondary processing. These include atmospheric and vacuum units, catalytic processes, units for producing oil bitumens and cokes, and production of polypropylene and lubricating oils.

In 2001 the refinery processed 4,786,000 tonnes of Turkmen crude, which represented an 80% loading on installed capacity. A wide range of oil products where refined - about 20 items - including motor and aviation fuel, bitumens, cokes, synthetic cleaning materials, polypropylene and other items.

At the point where Turkmenistan gained its independence it was not possible to efficiently refine the continuously growing volume of oil production. This was because the equipment in the refinery was outdated and worn out, using old technologies and with a small amount of secondary processing compared to primary processing.

In addition, the structure of demand for oil products in Turkmenistan and throughout the world was continually changing. There was strong growth in demand for oil product exports against the background of slowly increasing demand on the domestic market.

These factors defined the task which had to be addressed by the refining and petrochemical industries in Turkmenistan. Reconstruction of the Turkmenbashi oil refinery was started in 1996 in order to meet demand for oil products within the country, and also export requirements, while at the same time resolving ecological tasks.

Reconstruction was carried out in 2 stages. The main focus in the first stage of reconstruction of the refinery was dictated by consumer demand - high demand within the country for various grades of motor oils, lead free petrol, and petrochemical products. There was also increased demand from foreign consumers for high quality oil products from the refinery.

The first stage of reconstruction envisaged modernisation of production and ensuring reliable operation of the refinery at a crude oil refining volume of 6 million tonnes per year. The first stage is nearing completion. In the process of implementing this stage, the following tasks were resolved:

— achievement of high rates of crude conversion (more than 85%)

— switching to production of lead free high octane petrol and shut down of production of 72 octane petrol and liquid ethylene

— meeting demand in Turkmenistan for polypropylene and lubricants

— increasing the export potential of the refinery

— raising quality standards, in particular of petrol and diesel fuel, to a level which meets the requirements which the European Union is planning to introduce after 2005

— introducing into the production process modern standards and rules for production safety and environmental protection.

To handle the tasks which had been set, advanced oil refining technologies were introduced into the production pattern at the refinery. In the main, these were processes developed by the UOP engineering company of the US. The following production units are now in successful operation:

— catalytic reforming with continuous catalyst regeneration

— millisecond catalytic cracking

— units for producing polypropylene and motor oils for the marke.

In the first stage, modernisation programmes on the existing production units, refinery infrastructure and power systems were also carried out.

During the first stage of the reconstruction of the refinery leading international companies also took part, such as Chioda, JGC, Marubeni, Nisse-Ivai, Itochu (Japan), Technip (France, Germany), the Iranian National Oil Construction Company, UOP, Foxboro (USA), Basell (Italy), Merhav (Israel) and others. Foreign investment of

about USD1.5 billion was brought in by the state to implement the first stage.

Once the **CCR** unit was brought on stream, it became possible to generate components for lead free petrol with octane ratings of up to 100. In comparison, the old unit which was in existence at the refinery produced petrol components with an octane rating of no higher than 85.

The basic products from the **MSCC** unit are high octane petrol components. The unit gives a yield of not less than 53% of the raw material used. Petrol output on the old unit was 22%. So all other things being equal, petrol output was increased by 2.5 times. With the installation of the **catalytic process units** annual output of liquefied gases rose from 16,000 tonnes to 365,000 tonnes, in other words a 23 fold increase. Local demand for liquefied gas is only about 15,000 tonnes. The reconstruction programme is also designed to allow for high grade processing of liquefied gases into high octane petrol.

At the end of 2001 and the beginning of this year, the first industrial plants in the country for producing polypropylene and lubricants was brought into commission. Output and sale of three grades of polypropylene - T30S, F79S, PD382 - has begun.

The first stage of reconstruction is nearly completed, and it has allowed us to increase refining intensity to 85% and, for the first time in Turkmenistan, organise production of polypropylene and lubricants. In other words, the Turkmenbashi refinery has now become a multi-faceted centre with a range of production centres.

The final element in the first phase of reconstruction is to build a new unit for primary oil refining, and diesel fuel hydrofining. We will also re-build the old L-35-11/300 reforming unit for use in hydrofining, converting this unit to hydrofining light gas oil with a bloc for refining butane-butylene fractions (compressed gas) into petrol. When the new hydrofining unit is in place, we can reduce sulphur content in diesel fuel by 150 times (from 0.15% to 0.001%). The German company Grim has already began design work on refining liquid gas into petrol and for light gasoil hydrofining.

The company Technip (Germany) will build a new diesel fuel hydrofining unit with capacity of 1.5 million tonnes a year. Depending on the requirements of the purchaser, this unit can process dirty, sulphurous gases either into solid sulphur, or into sulphuric acid, or into sodium thiosulphate fertilizer for agriculture.

In the second stage the task is to raise production capacity at the refinery to 9 million tonnes per year, and to start production of high quality oil products for export. Implementation of the second stage will raise refining intensity to 95% and will allow for integration of oil refining, petrochemicals and gas chemical operations.

In the second phase of reconstruction of the Turkmenbashi refinery we will be giving priority attention to reducing the volume of harmful emissions into the air, water and soil, in line with the Caspian Ecological Programme in Turkmenistan.

In order to further improve the ecological situation in the Caspian Sea basin, a programme of environmental protection measures at the Turkmenbashi refinery has already been drafted. Implementation of these measures will be financed by income from sales of oil products generated during the process of recovering and refining oil wastes.

Once the total reconstruction of the Turkmenbashi refinery is finished the proportion of secondary processes on the site will increase from 37.5% to 92.5%, compared to primary processes. This will lead to a significant increase in output of petrol and diesel fuel. So we can say with all certainty that, after reconstruction, the Turkmenbashi refinery will meet the main international criteria and standards and will be similar to most modern refineries elsewhere in the world.

Now to the second part of my presentation, which deals with the development of the export system for the oil and gas complex.

2. Structure of the exports of oil and oil products from Turkmenistan

At the beginning of the third millennium, exports of oil and oil products are characterised not only by large volumes of high quality low sulphur M-100 fuel oil, but also crude oil and diesel fuel. In fact as early as 2000-2001, export volumes of crude oil and diesel fuel were already approaching the volume of fuel oil exports.

In 2001 there was a significant, multiple increase in the volume of petrol and liquid gas exports. And new export products appeared - base lubricating oil and polypropylene.

The geographical location of Turkmenistan means that hydrocarbon raw materials can be exported in various directions:

— western route - to countries in the Black Sea and Mediterranean areas

— southern route - to the Persian Gulf and from there to South East Asia

— south east route - to Afghanistan, the Iranian province of Khorasan, Pakistan, Tadjikistan

— northern route - with favourable market conditions, in transit through Russia to north west Europe.

Exports, with the exception of supplies to Iran and Afghanistan, involve transit across the territory of foreign states. And hydrocarbon transit is usually very profitable for the transit countries. During transportation of crude oil through one country or another force majeure can play a role, so Turkmenistan is basing its policy on the simultaneous use of several alternative export routes, which guarantees its economic security and freedom of choice. At present there are several basic export routes for Turkmen hydrocarbons:

— Rail or road transport to neighbouring Afghanistan, Uzbekistan and then to Tadjikistan and Kirgystan, as well as some export volumes which reach Iran by rail as an alternative to sea transport

— By tanker across the Caspian to Iran, Russia and Azerbaidzhan. The maximum displacement for ships using the terminal at Turkmenbashi is 7,000 tonnes, but in future when dredging work at the terminal has been carried out it will be able to handle larger vessels.

— Oil products can be shipped by tanker to Baku and taken on by rail to the Black Sea port of Batumi. In addition oil can be supplied through Russia, using the sea port of Makhachkala and the existing oil pipe line. Or it can go via the Volga-Don Canal to the Black Sea, or by rail to the Baltic Sea and then to Northern Europe

— Oil can also be transported through Iranian ports on the Caspian Sea, then by rail through Iran to the Persian Gulf, as well as on the basis of SWAP deals with onward transportation to Europe and Asia

— In addition, on the basis of a decision by our President, the liquefied gas export infrastructure will be developed. At present construction work is underway on modern terminals to store and handle liquefied gas at the Turkmenbashi refinery and in south eastern Turkmenistan (Serakhs and Serkhetabad). This will make it possible to increase several times the volume of exports of liquefied gas by rail and road to Iran, Afghanistan, and in the future to Pakistan.

— A facility has been built for storing and handling polypropylene at the Turkmenbashi sea port, and exports of polypropylene by sea have already started to various destinations, for example Iran, Turkey, Azerbaidzhan, Russia and European countries.

— Construction work has finished on the new oil base in Atarmurat in the east of Turkmenistan. This means that export products from the Saidin refinery can be delivered to Afghanistan.

A significant share of oil product export volumes are sold at auctions by the Turkmen State Raw Material Exchange. This fully mirrors the trends in a market economy and protects the interests both of Turkmenistan and of foreign oil traders.

The system functions on the basis of standard export contracts, and this guarantees equality of opportunity for our customers, as well as speedy completion, approval and registration of export contracts. The precision of the

work done by the Turkmenistan export service can be seen by results achieved. For example in 2001 more than 220 contracts with more than 60 foreign companies were concluded. These included our regular customers and partners, such as Veba Oil (Germany), Glenkor (Sweden). Vitol (Sweden), Argomar Oil (Austria), Elf Trading (Sweden), Som Petrol (Turkey), Itochu (Japan) and many others.

In December 2001 a decree of the Turkmen President set out new procedures for offering and selling energy products for export. Under the new system an observer council has been set up with representatives from the government, the State Raw Material Exchange, Customs Service, representatives of sellers and producers of oil products, brokers and other interested parties, and with the participation of state authorities, which also have an interest.

After the volume of energy products and pricing conditions for them have been agreed with the observer council, they are offered for auction. Auctions take place every week. For three days prior to the auction, information is published in the media, quoting prices for the goods on offer and the place and time of the auction. In this way, sales of energy products by auction form the basis of an open door policy.

The open way these in which these auctions are held, with equal rights for all competitive participants (brokers) helps to provide the best available price.

Natural gas exports 1992-2002

In 2000 Turkmenistan sold more than 33 billion cubic meters of gas to the CIS and the Islamic Republic of Iran. In 2001 the figure was more than 37 billion cubic meters. In 2002 we are planning to offer about 45 billion cubic meters.

The current routes for exports of Turkmen gas are:

— Turkmenistan (Korpedzhe) to Iran (Kurtkui) pipeline

— CAC-3 pipeline, which starts in western Turkmenistan and then passes through Kazakhstan and Russia with access to the European market - the Turkmen section of the gas pipeline stretches to about 540 km. with throughput capacity of 10.5 billion cubic meters

— CAC-4 pipeline, which goes from eastern Turkmenistan through Uzbekistan, Kazakhstan and Russia, and then to Europe.

With every year that passes there is a growing tendency for a significant increase in the use of natural gas, as a cheap and ecologically clean raw material for use in power generation and in various other spheres of human activity.

Along with exports of natural gas as a raw material, a lot of work is being done on gas refining. In 2002 production of liquid gas will reach to 170,000 tonnes. Most of this production will be sent for further refining to produce high quality petrol and also for export.

Over the years of independence, Turkmenistan has sharply activated its foreign trade operations, following a process of integration with the world economy and making a reality of the open door policy declared by the Turkmenistan President. This ensures access and the possibility of beneficial partnerships with all those companies in the world who wish to work with Turkmenistan.

The traditional features of Turkmenistan's foreign trade operations which have been created over the years of independence, include:

— creation of equal conditions on the market for Turkmen exports of hydrocarbon raw materials and refined products

— respect for and support of the mutual interest of all parties

— honest partnership and cooperation.

We will be genuinely glad to have you as a partner and participant in foreign trade operations in Turkmenistan.

Thank you for your attention. ■

Orazmukhammet Atageldyev, chairman of SC Turkmengeologia, spoke on implementing 3D seismic surveys, mastering modern seismic data-processing programs, priorities for geological survey projects, and measures to increase their efficiency as stipulated by the program for developing geophysical projects in Turkmenistan for 2001-2002.

POSSIBILITIES FOR THE USE OF MODERN TECHNOLOGIES AND EQUIPMENT IN GEOLOGICAL EXPLORATION WORK ON-SHORE IN TURKMENISTAN

Turkmenistan has enormous potential in terms of proven, probable and possible hydrocarbon reserves and resources. Both on-shore and off-shore, these reserves are distributed unequally in terms of depth and stratigraphic profile. Exploration for hydrocarbons on-shore in Turkmenistan is carried out by three organisation: Turkmengeologiia, Turkmengaz and Turkmenneft.

Turkmengeologiia is a state national company for geological exploration work in the Turkmenistan oil and gas complex. The company carries out integrated studies of below ground resources for the whole country, as well as prospecting and exploration for oil and gas deposits, and other valuable resources. Turkmengeologiia undertakes these on-shore studies mainly using its own efforts, under the terms of a directive from the President of Turkmenistan Saparmurat Turkmenbashi.

Given the tasks currently facing the Turkmenistan oil and gas sector, geological exploration work takes on a special significance. These tasks can only be achieved in the time frame allotted through the application of modern techniques and equipment, which are already well established in world practice, to carry out geological exploration work for oil and gas. Particular attention is paid to introducing 3D seismology into our practical work.

The introduction of 3D seismology methods began in 1998, when Turkmengeologiia acquired field equipment from the French company Seres, comprising an SN388 registration unit and 27 tonne vibrators from Mertz. Payment for this equipment was through a credit guarantee from the French Government.

Training for the personnel working on this modern equipment was provided in France by staff from CGG. The first 3D seismology studies were also carried out together with CGG, on the right bank of the Amudariya river, in the Altin Asir block. This covers an area of 500 sq. km. and includes the Bereketley, Perguiy, Yanguiy, Northern Yanguiy, Chashkuiy and Sandikly gas fields.

Processing of the data was done jointly with CGG specialists, using Geovector Plus software. Interpretation of the materials was carried out by specialists of the Ashgabat field work team and Turkmengeologiia using interpretation techniques developed by one of the world's leading companies in this area - Schlumberger Geoquest - using Geoframe software.

On the basis of results from 3D studies we were able to draw up an evaluation, and to estimate figures for hydrocarbon reserves in the gas fields named above and also other in promising areas using data from exploratory drilling at a small number of wells - which allowed us to save money on a large volume of expensive drilling.

As well as mapping structural surfaces, materials from 3D seismology make it possible to study the internal structure of reservoirs, evaluate the effective volume of traps, establish the filtration-volume parameters of the seams, fluid saturation and so on. These materials also optimized the process of subsequent development of these areas.

The 3D seismology method is substantially more efficient than traditional methods for evaluating the industrial potential of a field. It makes it possible to get a significantly higher growth of hydrocarbon resources for each linear meter of drilling. This can be illustrated by the following figures: one well accounts for 4.6 billion cubic meters. One meter of drilling equals 1.4 million cubic meters. The cost of exploring for 1,000 cubic meters of gas is 3,733 manat.

Currently Turkmengeologiia is paying special attention to studying oil and gas fields and promising areas in South West Turkmenistan, because this area is crucial to the future development of the oil potential of the country.

Future development of raw material base in Western Turkmenistan is linked to exploring known deposits in the Pliocene complex, and also looking for new hydrocarbon traps in deep lying Pontian-Miocene and Mesozoic sediments, including the tapering and non-anticlinal traps which are connected with these zones along a joining zone between the east coast of the Caspian and the coastal strip.

At present, 3D seismological exploratory work is being carried out at the Korpedzhe, Akpatlavuk and Chekichler fields. Studies are also underway in the Southern Gamishlidzha, Ekrem, Nebitlidzhe, Shatut and other sites. Some of these studies are being done jointly with the WestemGeco company, which is a strategic partner of Turkmengeologiia in Western Turkmenistan.

The geological structure of the connecting zone between the Caspian Sea and dry land is still an open question. That is why in the near future we are planning both 3D and 2D studies in this zone, which will take in the whole of the Ekrem bloc, including the inaccessible marshy areas.

The processing of materials generated by seismology using modern processing units, and the interpretation of integrated geological and geophysical materials (using data from geological well logging, VSP and others) makes it possible to get high quality information about the structure of the section to a depth of 8-10 km. On the basis of the results from these studies we will construct a more accurate geological model of the field and evaluate hydrocarbon reserves.

Another area for the use of new technologies is the introduction of new software to process seismological materials (Promax, Omega and Focus processing packages). The use of these programmes allows you to get additional information from existing data produced by 2D exploration, including secondary processing of materials produced in the past, thereby avoiding the need for new field work.

Work is currently underway to restore old magnetic tapes so they can be used alongside the new data.

Decree No.5425 of the President of Turkmenistan, dated 20th November 2001, set out "A programme for the Development of Geophysics in Turkmenistan 2001-2002". Under this programme, Turkmengeologiia will be focusing on the introduction of modern technologies into its area of operations, both in geophysics and in other geological exploration studies. We will do this by buying new equipment and software from the world's leading companies. In the coming years the company is planning to bring its work up to international standards. To achieve this we are looking at various measures designed to raise the activities of the geology exploration sector to a qualitatively higher level.

These measures include:

— acquiring high technology drilling equipment, including that used for deep wells (6-7 km), and for carrying out work in difficult mining and geological conditions

— acquiring fully equipped geological suites (seismic, gravimetric, electric and geophysical exploration equipment) to increase the efficiency and productivity of our work and also to get as much information as possible

— re-equipping the Ashgabat field work team with modern equipment and software to process and interpret the full range of geological and geophysical data

— creating a corporate database in order to make the optimum use of all existing information

— training staff in modern working methods, including economic questions

— introducing modern technologies into modeling oil and gas fields and reservoirs, evaluating and estimating hydrocarbon resources, and carrying out work to open up and monitor oil and gas fields.

To achieve these tasks the Programme envisages allocating more than USD93 million. You have already heard by the presentation by the Minister, Mr. Nazarov, about which companies we are currently working with and negotiating with. For my part I would like to conclude by underlining the need to move ahead in the following areas:

1. Continuing to work on introducing modern technology for seismic exploration, including a full scale modification of CMP. In the near future, we will be acquiring new equipment to process and interpret seismic materials, software, and also technologies for interpreting integrated geological geophysical data. This will allow us to increase the information content of our studies of below ground structures in Turkmenistan, and provide us with a high level of certainty when identifying the presence of valuable minerals in these structures.

2. Creation of a corporate database of geological-geophysical information, putting in place direct links between sub-departments in Turkmengeologiia so that information can be continually updated and used in the most effective way possible.

3. Introducing new drilling technologies for wells at great depths (more than 5,000m). We have already began to implement this by bringing into operation drilling rigs produced in China.

Thank you for your attention. We look forward to meeting you in Turkmenistan. ■

Opportunities to introduce modern technologies and equipment for onshore oil production in western Turkmenistan were highlighted by Saparmamed Valiev, chairman of SC Turkmenneft. He cited examples of cooperation with foreign companies in this sector and specified areas in which the concern anticipated cooperation proposals.

EXPERIENCE OF USING MODERN OIL PRODUCTION TECHNOLOGY AND EQUIPMENT FOR ONSHORE OIL PRODUCTION IN WESTERN TURKMENISTAN, AND POSSIBLE USES IN THE FUTURE

Within the structure of the Turkmenistan oil and gas sector, Turkmenneft is primarily responsible for a wide range of work needed to increase oil and gas production and develop the hydrocarbon potential of western Turkmenistan, especially in the region bordering the Caspian Sea. To achieve this Turkmenneft works through a large number of enterprises some of which are related to basic production and others which are auxiliary companies, including production, drilling, transportation, constructional and maintenance enterprises, as well as scientific, research, and design companies involved in geophysical projects.

The favourable conditions which have been created for companies in the oil and gas sector by the President of the country Saparmurat Turkmenbashi, as well as close cooperation with numerous foreign companies who have been attracted into the sector, has allowed us to achieve good results.

Currently, Turkmenneft is developing 22 oil and gas fields, and production volumes are growing steadily. The region has a good oil and gas infrastructure which is continuously being improved.

The oil and natural gas which is produced in Western Turkmenistan is characterised by excellent market qualities - containing almost no aggressive chemical components such as sulphur, carbon dioxide and hydrogen sulphide gas.

Further development of the oil and gas complex in the West Turkmenistan region will be through the application of new, highly promising developments in geological exploration and with the use of modern, efficient technologies for well drilling, developing hydrocarbon fields and deposits, capital repair of wells, oil and gas production and so on.

Geological exploration

Turkmenneft is directly involved in prospecting for major potential oil and gas fields in deep lying mesozoic deposits.

The first of these wells were sunk at the Cheleken, Eastern Cheleken and Akpatlavuk hydrocarbon fields. Other high amplitude structures such as Ekerem, Gamyshlydzha, Gogerendag and others, will be subjected to exploration drilling. The prospects of opening up major new reserves at these sites is based on the presence of very large terrigenous and carbonaceous in the early Cretaceous and upper Jurassic deposits in the depth range 5,000-6,500 meters. Another very promising new area of exploration for oil and gas is in the area around Khazarsk, which stretches for 300 km along the Caspian coast. Geophysical exploration, interpretation and preparation of sites for drilling was carried out by Turkmen organisations with the assistance of the English company Western Geco.

Drilling operations

Many of the problems in this area are the result of increasing depth of drilling. We have seen the opening up and large scale drilling of deposits at significant depths - 3,500-5,000 meters. Drilling units of Turkmenneft are currently working to adapt their drilling technologies, to bring them into line with these more complex drilling conditions. They are also looking at fundamentaly new technical solutions for drilling and completing deep wells.

At drill number 33 in the Eastern Cheleken area, for the first time in Turkmenistan, the full range of studies which the Schlumberger company can offer was applied at a depth of more than 4,600 meters. This involved lowering geophysical equipment into the well in drilling tubes.

In the preparations for drilling exploratory wells in the Mesozoic region of the Eastern Cheleken area at a depth of 6,500 meters, special attention was paid to the construction reliability of the well. Modern anti-blowout equipment was used, as well as computerised telemetric systems for monitoring the drilling parameters and for logging during the drilling process.

All of the wells which have been drilled or repaired in the Khazar contract territory are equipped with modern venting units manufactured by Betko Gray, one of the world leaders in this area.

We have also paid special attention to the search for more up to date drilling bits, as well as measuring equipment which can be used during the drilling process without raising the drilling column, horizontal drilling, the use of new top-drive drilling systems, multi channel drilling pipes used to break the critical area with a large number of special high pressure nozzles, and many other new products. Turkmenneft is happy to accept and consider proposals from potential foreign partners in relation to all these types of equipment.

Developing fields and deposits

All of the hydrocarbon fields in Western Turkmenistan have a multi-seam structure and they contain between a few dozen and 100 or more separate deposits. A very specific approach is required when designing and implementing the development of each of these deposits, for the following reasons:

— the large number and variety of deposits

— saturation characteristics, and the balance between liquid and gas form hydrocarbons

— thermodynamic conditions

— collector characteristics of the enclosing rock formations

— complications caused by fracture formation

— a significant variation in productivity along the vertical axis

— other specific characteristics.

A significant proportion of the reservoirs in the red-bed deposits in most of the fields are associated with low permeable and complex structure collectors of sand-silt stone rock formations. Some of the oil deposits are connected with narrow oil fringes of large gas caps.

Developing deposits like these which are very wide spread especially in the south Gogerendag-Ekeremsk region calls for a specially close study of technologies and equipment which have been specifically developed for these conditions. To achieve this Turkmenneft has in recent year began using a whole range of innovative methods.

We have introduced a technology of simultaneous-separate operation of two strata in one well. This gives an excellent result by reducing drilling costs, increasing current production, and speeding up the process of bringing new deposits into use. We have began introducing this technology at the Southern Gamyshlydzha and Korpedezhe.

We are using an "oil strata - gas strata" approach to allow for production of oil or gas, depending on seasonal factors. The new technology has been implemented by the KPC Trust with the participation of Schlumberger and using equipment which has been

developed by them. We have achieved a significant acceleration at wells where this technology is being used by also applying cable based methods and "sleekline".

A good result, and increased oil yield, has been achieved by opening up low porosity strata in depressions using powerful drills produced by Schlumberger (PNK-86 and Enerjet). At wells in strata A of the Goturdep field we are using a technology to strengthen the critical zone, and to combat sand seepage which has been developed by the Chinese Oil Engineering Construction Company who are also involved with introducing this technology in Turkmenistan.

Given the difficult oil and gas saturation conditions of the lower red-bed deposits, we need to be able to diagnose and reveal all the possible productive strata by using improved strata testing equipment during operational drilling. This task is especially important at the wells in south west Turkmenistan - Southern Gamyshlydzha, Nebitlidzha, Akpatlavuk, Chekichler and others. At these fields in the near future (up to 2005) we are expecting to drill about 35 oil production wells and up to 15 gas wells at depths of between 3,000 and 4,000 meters. Turkmenneft is ready to work with foreign companies on this problem, if economically acceptable terms are put forward.

In order to understand the current configuration of deposits which contain the remaining oil reserves at a group of fields which have been in operation for a very long time - Nebitdag, Cheleken, Ekerem and others - we think it would be a wise move to carry out 3D seismic exploration. Cooperation with foreign companies is also possible in this sphere.

Oil and gas production

The specific characteristics of the structure of oil and gas deposits, of strata and strata fluids, and of the way these change during the course of working the deposits.

All of this gives rise to the need to resolve various problems which occur during the operational life of a well:

o Gas-lift well operation. Turkmenneft has developed and introduced a high pressure gas-lift system which provides the lowest possible gas extraction point and increased depression in the seam.

To achieve this, block compressor stations have been installed at the Goturdepa and Barsagelmes fields, with working pressures of 120 atm. To optimise the working regime at gas lift wells it is absolutely vital to have information on operational parameters, and to continually monitor the regime using computer based gas-lift system complexes.

— Operating wells with sub-surface pumping. In wells with sub-surface pumping, the static and dynamic levels, and parameters of the work of the pumping unit are defined through echo-sounding and dynamometrics and with the use of AKD-03 autonomous computerised dynamographs, which have shown good results.

— Technologies for impacting on the critical zone of strata and wells. We are interested and prepared to cooperate on testing technologies to impact on the critical zone of strata of production wells.

— Gas preparation. Turkmenneft faces the task of making a soundly based choice of a method of gas preparation. This needs to ensure we reach the required quality indicators appropriate for a field in the later stages of its development where well head pressures are insufficient to generate cooling through the throttling effect. The use of absorption technology is a possibility. Another pressing problem is the preparation of gas simultaneously with extraction of liquid hydrocarbons.

— Capital repair of wells. In 2001 trials were carried out with units for repairing wells with the use of flexible pipe and "sleekline" technology. Good results were achieved giving grounds for a wider use of this type of unit. Packers, circulating collars and emergency separators were installed during repair work on wells in the Eastern Cheleken field.

Using refined brines as the basis of finely filtered compounds of chloride and calcium bromide gave good results when wells were shut down for capital repair. For work in deep wells we need to replace the existing broken down and outdated lifting equipment with modern equipment which has higher lifting capacity.

Turkmenneft is also ready to consider other proposals in the oil and gas production area.

Turkmenneft's total purchasing requirement for new equipment and technology in the period to 2005 is estimated to be in the order of USD120-150 million.

Thank you for your attention and welcome to Turkmenistan. ■

Khoshgeldy Babaev, chairman of the State Agency for Caspian Sea Issues under the President of Turkmenistan, familiarized the delegates with the Turkmen Caspian sector oil and gas resources development program, focusing on prospecting and exploration projects and hydrocarbon production carried out under PSAs. He mentioned the licensing program and specified priority demand for offshore technologies, especially as related to drilling platforms and the development of sea transport and port infrastructure.

TURKMENISTAN'S PRIORITY REQUIREMENTS FOR EQUIPMENT, SERVICES AND TECHNOLOGIES TO DEVELOP HYDROCARBON EXPLORATION AND PRODUCTION IN THE TURKMEN SECTOR OF THE CASPIAN SEA

Oil companies from many countries of the world are currently attracted to Turkmenistan for many reasons:

— policies of the Government of Turkmenistan

— the neutral status of our country, as officially recognised by the UN

— political stability in the country

— legislation which guarantees to protect the rights and investments of Western partners

— favourable tax regimes

— the presence of significant oil and gas resources which have been confirmed by Turkmen and foreign experts.

The oil and gas sector, as the leading industrial sector in Turkmenistan, has a decisive impact on the development of the country's economy.

In line with the Programme of the President of Turkmenistan "Strategy for socio-economic reform in Turkmenistan in the period to 2010", the plan is to bring in foreign oil companies to open up the hydrocarbon resources in the Turkmen sector of the Caspian Sea. These companies have enormous experience in exploration and production of oil and gas on the shelf, and they have access to modern technology and equipment.

The Caspian Sea is world's largest inland body of water, and it has unique natural resources and colossal reserves of hydrocarbon. It is considered one of the richest oil and gas bearing basins in the world.

1. Prospecting and exploration work and production of hydrocarbons in the Turkmen sector of the Caspian

In the period 1996 and 1998 the Western Geco company (Western Atlas) undertook seismic exploration work covering the territory of the

entire Turkmen sector of the Caspian Sea. In the course of these studies, using the most modern technology and equipment. 16,130 linear kilometres of seismic profiles were generated in total.

For the first time in the history of geological exploratory work in the Turkmen sector of the Caspian Sea, a company which owns the world's largest fleet of specialised seismic study vessels, using the most up to date equipment, carried out seismic studies of the shallow water areas of the Caspian, at sea depths of less than 10 meters, as well as the coast of Turkmenistan. In this way they defined the geological links with the existing network of onshore wells.

As well as this we now have an up to date seismic database, thanks to which the Government of Turkmenistan now has more precise information about below ground oil and gas resources in the Turkmen sector of the Caspian Sea.

Between 1999 and 2000 Turkmen and foreign specialists carried out a joint processing, interpretation and full analysis of the geological and geophysical data from the Turkmen sector of the Caspian Sea (more than 77,000 linear kilometres of profile) using the latest software, which made it possible to give a quantitative evaluation of the hydrocarbon potential based on new data.

Time and structure maps of six promising strata have been constructed, for the first time. As a result of the interpretation and analysis of new data, promising structures which had been revealed earlier could be confirmed. Several large zones which were promising from an oil and gas point of view were revealed and classified according to their potential. A new model for the generation, migration and accumulation of hydrocarbons was drawn up based on the genesis of the territory of the Turkmen sector of the Caspian Sea and of the neighboring regions.

Likewise, for the first time we received new, reliable information (up to 10 sec.) about deep lying geological boundaries (up to 15 km.). This information was the starting point for the technical base used to evaluate and classify the hydrocarbon potential and to decide upon future strategy for attracting foreign investment and modern technology into oil and gas exploration and production projects.

As a result of careful selection of the parameters for estimating promising oil and gas strata at depth intervals of 2,000-7,000 meters, independent experts have been able to evaluate the hydrocarbon potential of the Turkmen sector of the Caspian Sea. This is 11 billion tonnes of oil and 5.5 trillion cubic meters of gas, excluding the contract territories of "Block 1" and "Cheleken". In other words, more than half the oil reserves and about 25% of natural gas reserves currently held by Turkmenistan, are concentrated in the Turkmen sector of the Caspian Sea.

Currently more than 112 wells have been drilled in the Turkmen sector of the Caspian Sea. The total volume of drilling amounts to about 440,000 meters. The territory has been studied at a rating of 5.64 meters per square kilometre. Ten oil and gas fields have been opened up, some of which are currently under development.

The main bulk of deep drilling is concentrated within the Cheleken - Livanovsky uplift zone, where more than 102 prospecting wells have been drilled with a combined drilling volume of 390,000 meters. All of the fields which have been opened up relate to this zone.

Existing PSAs.

Under existing agreements two foreign companies are currently working in the Turkmen sector of the Caspian Sea on hydrocarbon exploration and production project based on PSAs, in the contract areas "Block 1" and "Cheleken". These are Petronas Charigali Oil (Malaysia) and Dragon Oil (Ireland - UAE).

PSA "Block 1"

Since starting work in this contract territory Petronas has carried out 2D and 3D seismic studies, using the latest technology and equipment. The locations for exploration wells were determined by the results of these studies.

Starting in 1998, and using an Iran-Khazar drilling unit, three exploratory wells have been drilled using a self-elevating rig: Makhtumkuli - 1X (East Livanov - 1X); Diarbekir - 1A (Barinov - 1A); Ovez - 1X (Central Livanov - 1X).

As a result of drilling the third exploratory well to a depth of more than 4,400 meters, and of sampling productive strata, industrial gas flows were received (770,000 cubic meters per day), as well as condensate (more than 300 tonnes per day). These drilling results confirmed the proposition that there was a broader zone of hydrocarbon spread to the north east, which was indicated by data from previously drilled exploration wells Makhtumkuli - 1X (Eastern Livanov - 1X) and Diarbekir - 1A (Barinov - 1A), where industrial flows of gas and condensate were also produced.

Modern technologies were used to drill these exploratory wells, which reduced drilling time and the unit cost of the well. An example would be the use by the company of a Top Drive electrical unit, a step type blow out preventor, diamond drill bits, logging while drilling, hydraulic hammer, and water based drilling solutions (KCL PHPA).

In February this year Petronas Charigali began drilling a forth exploratory well Makhtumkuli - 2A (East Livanov - 2A). After completion of the drilling and sampling process, the company is planning to start developing this field.

Cheleken PSA

At present production of hydrocarbons in the Turkmen sector of the Caspian Sea is only underway within the Cheleken PSA operated by Dragon Oil (Turkmenistan) Ltd in the Cheleken contract area. In 2001 drilling of two production wells has been completed: Dzheitun 22/101 (LAM 22/101) and Dzheitun 22/102 (LAM 22/102) from a fixed offshore platform in the Dzheitun (LAM) field.

At the beginning of February 2002 testing of the Dzheitun 22/102 (LAM 22/102) was successfully completed. The depth of the well was more than 4,100 meters, to a point where in an open geological section of the well the material from geophysical studies pointed to the existence of very large oil and gas producing strata. When the four oil and gas strata were sampled the yield on the well was more than 350 tonnes of oil per day.

During 2002 Dragon Oil is planning to drill three more wells, and as early as March this year drilling began on the Dzheitun 22/103 (LAM22/103) operational well, which is expected to be completed within 100 days.

The main efforts of the company are directed towards raising production levels and reducing unit costs of production. The company bases its work on entirely modern, but already well-tested methods of drilling and terminating wells.

All the wells which have been drilled were terminated in several productive strata, which makes it possible to undertake simultaneous-divided exploitation of the seam, and to count on increasing the amount of retrievable reserves. This also makes it possible to increase efficiency and profitability of the project. In 2001 the company produced more than 320,000 tonnes of oil, and in 2002 is planning to double this figure.

In addition Dragon Oil intends to carry on with construction and modernisation, including onshore facilities and the system for collecting production.

2. Licensing programme

In order to attract additional investment, as well as the experience of foreign companies to develop of oil and gas complex in Turkmenistan, a new programme for licensing hydrocarbon exploration and production in the Turkmen sector of the Caspian Sea was drafted on the initiative of the Turkmen Government in 2000.

In line with this programme, 32 promising offshore oil and gas blocks were set out within the Turkmen sector of the Caspian Sea, to be explored and opened up by foreign investors.

Licensing of these blocs will be carried out in line with the Turkmenistan law "On hydrocarbon resources". PSAs

are seen as the most attractive form of cooperation. All work linked to the offshore project under PSA agreements will be carried out in line with Regulations for developing hydrocarbon fields in Turkmenistan in the "golden" era of the Turkmen people.

These Regulations fully correspond to the principles used in international oil industry practice, as well as the articles in the law "On hydrocarbon resources". These envisage using the most up to date and safest technologies needed to carry out work on exploration, evaluation, development and production of hydrocarbon resources.

The active use of international experience and modern technology and equipment in implementing these hydrocarbon exploration and production projects in the Turkmen sector of the Caspian Sea will help to significantly increase hydrocarbon reserves and production volumes and also to speed up the integration of Turkmenistan's oil and gas industry into the international energy system.

3. Priority requirements for technology.

1. **Prospecting and exploration work off-shore**: modern methods for geophysical study of offshore structures and fields.

2. **Offshore drilling**: modern technologies for drilling wells at sea, including slope/directional, multicore and horizontal wells, well completion in offshore fields with unusually high formation pressures, methods for opening up and killing these wells, modern methods for liquidating offshore oil and gas wells and offshore infrastructure, floating and fixed drilling units.

3. **Developing and producing hydrocarbons**: modern methods for evaluating offshore wells, the latest oil, gas and condensate production technologies offshore, collection, preparation and transport of hydrocarbons, methods for protecting surface and submersible oil and gas equipment from corrosion, creation of onshore infrastructure and auxiliary vessels to support offshore working.

4. **Protecting subsurface resources, environmental safety during offshore oil and gas development**: modern methods for liquidating oil spills at sea, methods for re-using drilling solutions and slurry from offshore production and so on.

3.1 Drilling platforms, ships and pipe laying vessels

List of the basic requirements for the offshore sector in terms of equipment and technology:

— self-elevating rigs capable of drilling at sea depths of 100-120 meters

— semi-submersible rigs able to drill to sea depths of more than a 100 meters

— evaluating the prospect for using offshore drilling rigs. We invite foreign partners.

A significant part of the territory of the Turkmen sector of the Caspian Sea is located at depths of less than 100 meters (more than 65% of the area), which suggests the need for self-elevating drilling rigs able to undertake drilling work at sea depths of 100-120 meters. The remaining technical parameters are still being studied. Alongside this, studies are underway into requirements for semi-submersible drilling rigs to be used in drilling work in promising oil and gas blocks of the Turkmen sector of the Caspian Sea, where the sea depth is more than 100 meters.

Turkmenistan is interested in bringing foreign partners into these projects who have experience of working with the latest technology used in this field. We also invite partners to take part in evaluating Turkmenistan's requirements for offshore rigs in the future.

At this stage we are studying proposals and are negotiating with interested foreign companies in order to sign contracts to build self-elevating and semi-submersible offshore drilling rigs, as well as pipe laying vessels and onshore bases for opening up the Turkmen sector of the Caspian Sea.

At present, because Turkmenistan does not have its own drilling fleet, foreign operators lease drilling rigs in neighboring countries. So the development by Turkmenistan of its own drilling fleet is today a vitally necessary task. Dealing with this problem will enable us to carry out our own prospecting, exploration and production work in highly promising areas, both through our own efforts and also together with foreign companies.

3.2 Development of marine transport and port infrastructure

The development of marine transport and port infrastructure is one more priority for us, bearing in mind that the Turkmenbashi seaport is the largest freight handling point for Turkmenistan's foreign economic trade, as well as an important link in the international transit route running from west to east along the Europe - Caucasus - Asia corridor.

The main task in developing marine transport, in line with "The national programme to 2010 of the President of Turkmenistan Saparmurat Turkmenbashi", is to extend and modernise port infrastructure and to develop the oil tanker fleet, including:

— reconstruction of the ferry terminal and port

— construction of oil tankers for exporting oil and oil products

— reconstruction and building of oil handling terminals at Turkmenbashi, Ekerem and Aladzha

— reconstruction and building of a ship repair yard, as well as warehouse facilities

— constructing a dock with lifting facilities of up to 5,000 tonnes

— acquiring fork lift vehicles and mobile cranes for handling cargos.

The involvement of foreign partners in these projects makes it possible to use their experience, new technology and equipment. The first steps in this direction have already been made:

— At the beginning of August last year the first Turkmen 5,000 tonne oil tanker came off the stocks at the Chelek Tekhnesan ship yards in Turkey. This oil tanker will allow Turkmenistan to reduce current expenditure on leasing foreign tankers, which Turkmeninstan uses every year to ship about 4 million tonnes of crude oil and refined oil products to Europe, Iran, Turkey and the countries of the Caspian region.

— As part of implementing the project to reconstruct the main "maritime gateway" of Turkmenistan, construction work has been finished on a dry cargo wharf designed for vessels of any type and class. The construction of the dry freight terminal using the most modern equipment was carried out by builders from the Turkish company CTFA. Alongside the wharf, a closed storage facility has been erected over an area of 5,000 sq. meters. Work is continuing on repairing other wharves at the port, which will be brought into use one at a time up to the end of the year. In the near future a Liebherr mobile, heavy-lift super crane will be installed at the dry freight wharf, capable of handling up to 500 tonne loads.

3.3 Protecting the environment, sub-soil resources and ecology during hydrocarbon exploration and production work in the Turkmen sector of the Caspian Sea, to preserve bio-diversity.

One separate aspect of hydrocarbon exploration and production in the Caspian, which has an equally high priority for us is the question of preserving bio-diversity and increasing the natural resources of the Caspian. Here we have to support the efforts of all those countries and international organisations whose activities are related to the study and preparation of proposals and recommendations designed to improve the existing situation. We always have to remember the relationship between finite and renewable marine resources and their significance, and about the unique ecosystem of the Caspian, which has been created by nature over millions of years of the earth's existence.

Under current international practice relating to oil operations, responsibility for averting and controlling the results of oil spills is borne by the

operating company directly carrying out the oil activities. As a result, Dragon Oil and Petronas, before they started work, drew up an Environmental Protection Plan, in order to protect the environment of the Caspian Sea. This plan was set out in the Rules for developing hydrocarbon fields in Turkmenistan in the "Golden" era of the Turkmen people.

As well as this, Dragon Oil prepared a draft plan of measures to be taken in the event of oil spills. For these purposes the company bought three modern systems, comprising a ship and equipment for localising and collecting oil and oil products. These have been installed in the drilling area, in Aladzha and in the coastal strip at the port of Khazar, so they can respond quickly to any oil spill and clear the surface in the event of an incident.

To ensure the proper level of preparedness to avert and combat pollution of the unique ecosystem of the Caspian Sea caused by oil or oil products spills, in August 2001 a decree of the President of Turkmenistan approved the "National Turkmenistan Plan for controlling and liquidating oil spills". The main aim is to minimise the effect of oil spills on the health and living conditions of the people and on the environment.

Dear colleagues! In conclusion, let me assure you that Turkmenistan is interested in cooperation which will open up opportunities for developing the Turkmen sector of the Caspian Sea on mutually acceptable terms. Neutral Turkmenistan continues with the "open door" policy of Saparmurat Turkmenbashi.

Thank your for your attention. ■

Annaguly Jumaklychev, chairman of Kuvvat Corporation, reported on the status of the Turkmenistan energy system, which is capable not only of supplying the nation with electricity but of exporting energy to neighboring countries. Generating capacity could be further increased by equipping power plants with more advanced equipment, such as gas turbine units.

OPPORTUNITIES FOR BUSINESS COOPERATION AND THE USE OF MODERN TECHNOLOGY AND EQUIPMENT FOR GAS FIRED ELECTRICITY PRODUCTION

Turkmenistan's **power generation system** is one of the fundamental sectors of the country's economy. It comprises an integrated network of enterprises providing for the design, construction, installation, repair, maintenance and operation of power generation facilities. It is also responsible for centralised power supplies to consumers as well as thermal energy used in some cities. The power generation system also has available factories for producing generating equipment and other electrical items.

The generating system comprises five thermal and one hydroelectric power station, with combined installed capacity of 2,652 mgW. Of this total, thermal stations have generating capacity of 2,651 mgW and the hydroelectric station 1.2 mgW.

There are 21 turbine units installed in the thermal stations, including 10 power units with output capacity of 210 and 215 mgW. All these power stations are gas fired using fuel from neighbouring gas fields. Boiler fuel from the country's oil refineries are used as an alternative energy source. The Turkmenistan power generation system works as part of the power system of the Central Asian states. At the same time the country is independent in energy terms, and excess electricity is exported to neighbouring countries.

In line with the programme for the economic development of Independent Turkmenistan which has been put forward by the President of Turkmenistan the Great Saparmurat Turkmenbashi, by 2010 production of electricity will rise significantly both through an increase in domestic consumption and through higher exports.

In order to meet the demand for electrical and thermal energy in the required volume and quality, the power generation system has to work steadily, to have the necessary operational reserves, to be independent in energy terms, and to grow at an accelerated rate. In a recent speech the President of Turkmenistan declared that, as it develops, the power generation system of the country must stay 25-30 years ahead of potential demand.

TECHNICAL-ECONOMIC INDICATORS FOR 2001 AND 2002 (first quarter) kW hr

	2001 r.	Jan-Mar 2002r.	Growth rate
Energy production	10.5	3.3	108.6
Consumption	9.5	2.7	106.5
Exports	1.0	0.58	120.0

Turkmenistan has very high levels of hydrocarbon reserves, so it can afford the luxury of building the most energy intensive types of production facilities, so in the near future there are planes to build pulp and paper, metallurgy, and aluminum factories. Oil and gas production and refining, the textile industry, processing agricultural products, and the chemical industry can logically be expected to develop, and these are at present the main users of electricity.

Currently there is a positive balance of installed generating capacity across the power system as a whole. But, because of the technical limitations of existing equipment at practically all power stations and on certain parts of the grid during maintenance programmes, there can be a shortage of generating capacity.

Some of the steam turbine equipment in the thermal stations was brought into commission as long ago as the 1960-80's. The position at the beginning of 2002 is that, of the 10 units with 210 mgW capacity, 6 have been in operation for 130,000-180,000 hours. But despite the age of the generating equipment, thanks to programmes of large scale maintenance and restoration work, power generation staff have been able to keep this equipment in excellent working condition.

Because all these power units are designed to be operated according to a basic working regime, problems arise with the steam turbine plants during summer operating periods. This is because there is a fluctuating daily electricity consumption pattern. So the loading on power generating equipment has to be dramatically reduced or even halted altogether during the night time hours. This leads to a significant reduction in output efficiency ratios and additional fuel costs.

We see the answer to these problems in installing the latest equipment available in our generating stations, in order to replace outdated plants - single and combined cycle gas turbine units.

In November 1998 a 123 mgW single cycle General Electric gas turbine unit was brought into operation at the Byuzmeinsk power station, and in the time it has been in use it has demonstrated:

— high levels of reliability
— ease of use and high levels of

COMPARATIVE FEATURES OF GAS TURBINES

Company	Turbine	Capacity mgW	Output ratio- %	Fuel use	Gas temperature chamber (°C)	Gas temperature exhaust (°C)
GE	MS 6001 B	42.0	32.0	383.8	1140	552
	MS 9001 E	124.5 123.0	35.1 33.8	350 363	T+5	538
	MS 9001 FA	226.5	34.4	357.0	1288	588
Siemens	V 94.2	159.0	34.2	359.0		548
	V 94.3	222.0	36.2	339.0		550
	V 64.3	63.0	35.4	347.0		529

T = operating air temperature +150°C

automation

— low running costs (fuel use 360 g/kW hour)

— highly flexible operating regime and quick start up (take up time 20-25 minutes, speed of loading from "0" to 123 megawatts - up to 30 minutes).

At present, preparation is underway for the construction of a second gas turbine unit at the Byuzmeinsk power station, also with generating capacity of 123 mgW. In the future there are plans to introduce modern technologies for the production of electricity using a combined steam-gas cycle on a 2-2-1 pattern (in other words 2 gas turbines, 2 regenerations boilers, and 1 steam turbine). This will make it possible to increase capacity on the gas turbine unit from 123 mgW to 180 mgW using the same amount of fuel, and to achieve a higher output efficiency ratio.

The installation of gas turbine units is also planned at other power stations.

In this way, the introduction of flexible generating capacity based on gas turbine and steam gas turbine units will not only lead to more reliable functioning of the country's power sector, but it will also ensure that the heat and power equipment at electricity stations will work more economically. This will reduce fuel use and environmental pollution in comparison to the current situation.

As you can see from the table the combined units (steam-gas cycle) are more economical mainly because they use regeneration boilers installed in the "tail" of the gas turbine. In addition, the construction of steam gas units requires less capital investment than is the case with steam turbine units.

Another factor favouring the universal spread of the use of steam gas units is the fact that they are able not only to produce energy and provide a high quality supply of thermal power to industry and households, but they can also make a substantial impact on improving the way in which the country's power generation system functions, primarily by providing reliability and manoeuvrability.

Advanced turbine systems

Alongside these gas turbines there are other areas of interest - fuel sales and hybrid systems.

In the next 100 years gas turbines and thermal power units will become the basic components of power systems. In 2000, as part of the ATS programme run by the US Ministry of Energy, some of the most ecologically friendly combined cycle gas turbine units were presented, which also had the highest output efficiency ratios.

COMBINED CYCLE

Company	Type of unit	Capacity mgW	Output ratio- %	Fuel use-gramme of notional per kW hr
GE	STAG-209 E	366	52.0	236
	STAG-209 FA	701	55.0	223
Siemens	GUD - 4.64.3	367	52.3	235
	GUD - 1.94.3	321	53.6	229
	GUD - 2.94.3	643	53.7	229

To achieve the aim of a hybrid energy cycle will require a long term programme which will also lead to the use, in the existing gas turbines, of the latest technologies which have emerged.

Gas turbines and power systems will reach their optimum operational parameters only through the development and use of:

— advanced cycle configurations combined with higher compression levels

— the use of improved alloys and ceramic materials with highly efficient cooling properties

— new combustion technologies, both as depleted compounds and catalytic systems.

The use of these emerging technologies in large scale gas turbine units and in advanced gas motors will lead to a significant reduction in the cost of electricity, emission levels, and fuel use. At the same time these turbines could be constructed to use hydrogen fuel with practically zero emissions.

Modernised motors used as power modules in small generating systems and hybrid cycles, and also used to rebuild or replace existing inefficient systems, will help to reduce greenhouse gas emissions. These advanced gas turbine systems will have an enormous impact on worldwide emissions of greenhouse gases, and will meet the needs not only of the domestic market, but also of the world markets.

We are closely following developments in worldwide power generation technology and we believe that Turkmenistan has everything needed for the latest achievements in this sphere to be introduced in our country.

Thank you for your attention. ■

Introduction of new technologies and methods of scientific research by the Turkmenistan Oil and Gas Institute were the major topics of an address by H. Babaev and B. Kurbanmuradov. An example of foreign cooperation is a project in which Schlumberger interpreted geological and geophysical data and plotted the field's geological and hydrodynamic models. Yet another important sector for cooperation with foreign companies is stimulation of gas and condensate production at operating wells in the developed fields and in during the testing and developing new wells.

INTRODUCING NEW TECHNOLOGIES AND RESEARCH METHODS

In accordance with Turkmenistan's "Strategy for development of the oil and gas complex in the period to 2010" oil and gas condensate production will increase to 48 million tonnes. Natural gas production will increase to 120 billion cubic meters, and there will be a dramatic growth in the refining sector. Such a rapid development rate in the oil and gas complex means there is now the need for the fullest possible participation of local staff in these developments to provide scientific support for the production process across the entire complex. This places a large degree of responsibility on the Oil and Gas Institute to increase the effectiveness and quality of the scientific, research, design and exploratory work which it undertakes.

In order to raise the scientific and technical potential of the Oil and Gas Institute to world standards we need to establish close cooperation with international oil and gas companies and their research and development centres. The particular areas of interest are modern research technologies, methods of providing services for the oil and gas complex, and the organisation of courses to improve the qualifications of scientific staff through the exchange of experience between personnel from both sides.

An example of this would be the project to introduce integrated technologies and equipment to interpret and decipher geological and geophysical data. This project has been carried out together with the Schlumberger company as part of an investment project covering the Yashildepe area. The technology and equipment package comprises:

— Geoframe licensed software systems - modules for interpreting geological and geophysical data, petrophysical and 2D seismology interpretation and processing of synthetic seismograms, mapping and evaluating volume modules, mapping logging characteristics, 3D visualisation and so on

— graphic stations - Ultra-10 and Ultra-60 with peripherals.

1. Geological and hydrodynamic modeling

The effectiveness of oil and gas prospecting and exploration work, and the ability to reach optimum design decisions when developing a hydrocarbon field, are dependent on the reliability of the geological and hydrodynamic models of the location. The primary sources for construction these models are taken from geophysics, and primarily from data from geophysical well logging and seismic exploration. That is why the use of advanced Western computer technology makes it possible to achieve a new qualitative level in the processing and interpretation of data from surface and well geophysics.

Specialists from the department of geophysics of the Oil and Gas Institute have successfully undergone training, and have also gained experience in using the new equipment. They have began work on interpreting and deciphering the geological-geophysical and industrial data from a series of prospecting, exploratory and operating sites run by Turkmengaz. The idea is to create a geological model of the fields and exploratory areas, as well as an estimate of their industrial reserves.

The use and intensive study of the Geoframe Multiuser System, with its broad functionality, has made it possible to get a clearer picture of the nature of the seams, and the structure of hydrocarbon fields and exploratory areas in the subsalt and upper layer deposits on the right bank of the Amudariya river - Yangui, Chashgui, Bereketli, Sandykly, Uzyngui and Malai-Chartaksk zones (Malai, Chartak, Baigushly and Kelyaka).

These studies have made it possible to achieve the following:

— to create the methodological basis for integrated interpretation of GIS materials in order to reveal and evaluate collectors which have complex pore area morphology

— to eliminate the discrepancies in time seismic sections at depths

— to generate synthetic paths based on geophysical well logging and VSP data in order to compare them with actual seismic data from neighbouring wells

— to clarify the position of stratigraphic boundaries and fractures and identify supporting and industrial strata within seismic sections

— to construct geological cross sections along the covers of the main productive strata and geometry of gas water contact based on integrated interpretation of surface seismic exploration, geological well logging, VSP and seam testing

— to carry out automated collector modelling and 3D visualisation based on the interpretation.

All of this will provide a more precise structure of the model of hydrocarbon fields and exploratory areas.

As we all know, it is practice throughout the world that the process of monitoring hydrocarbon fields from the point they come into operation is carried out on the basis of a continuously updated digital, geological-hydrodynamic model of the reservoirs.

On the basis of the experience acquired by our specialists, the next stage in the implementation of this project by the Oil and Gas Institute will be the creation of such models for the major hydrocarbon fields in Turkmenistan, such as Dovletabad, Malai and others. The special status of these fields means it is vital to exclude the possibility of any problems or loss of reserves during the development process, and also to achieve maximum yields from the site.

The creation of a 3D digital geological-hydrodynamic model makes it possible to design a range of development alternatives for the future the field, and at various stages to define the possible technological risk. One can also monitor the way in which these develop by making up to the minute additions to the model, using new data generated on-site.

Bearing in mind the large volume of geological and technical material available and the long period of time during which these fields have been operating, the process of digital geological-hydrodinamic modelling is a very labour intensive theoretical-practical task. In general, the proposal is to do this using local staff, and cooperation with foreign partners will take the form of supplies of the software packages needed (the modules relating to reservoir modelling, and simulation of design and management processes), as well as powerful graphic stations with peripherals, and consulting services.

2. Intensifying gas and condensate production at industrial wells

Another important area of cooperation with our foreign business partners is intensification of gas and condensate production at currently operating wells located in fields which are in production, and also in the testing and start up of new wells.

Flow intensification is based on undertaking work in the critical zone of the well using chemical reagents, water inflow isolation, control of sand seepage, the use of various types of hydraulic fracturing of the seam, and many other techniques. The Oil and Gas Institute has scores of patented inventions and scientific innovations relating to this kind of work, which are relevant to the specific characteristic of hydrocarbon fields found in Turkmenistan.

According to preliminary estimates by specialists, expected annual increase in the volume of gas production resulting from flow intensification methods could be up to 5 billion cubic meters. Bearing in mind the potential of this area of work, the Oil and Gas Institute is currently looking into ways of setting up a service centre, which could be on the basis of joint operations, to intensify gas production based around the Shatlyksk Integrated Department.

Cooperation with foreign partners is an urgent issue in areas such as:

— equipping the service centre

— joint efforts in the testing of imported chemical agents and creating analogous items based on local raw materials and industrial wastes

— developing technologies for the construction of wells under conditions of abnormally high and abnormally low seam pressure, salinity, plastic movement of rock formations and hydrogen sulphide corrosion

— equipping the Oil and Gas Institute with modern laboratory facilities, research instruments, methodologies and technological software packages.

In this way, cooperation with foreign partners, and the introduction of new technologies and research methods are seen by the Directors of the Oil and Gas Institute as an important factor in the growth of its scientific and technical potential, which will allow the institute to make its own significant contribution to the development of the oil and gas complex in the Golden area of the Turkmen people. ■

In their closing remarks, the delegates formally praised the president of Turkmenistan.

ADDRESS TO FIRST AND PERMANENT PRESIDENT OF INDEPENDENT NEUTRAL TURKMENISTAN HONORABLE SERDAR SAPARMURAT TURKMENBASHI

Honored Serdar!
Esteemed Saparmurat Turkmenbashi!

Under your direct guidance and personal involvement as an outstanding politician and statesman of the present time neutral Turkmenistan acquired in the first ten years of independent development visible outlines of a harmoniously developing state with a national coloring, which is rapidly integrating into the global economic system.

Turkmenistan's oil and gas sector is being developed at an accelerated pace thanks to your unremitting attention and fatherly concern, preconditions are being developed to integrate it into the world energy system.

Your speech of welcome inspired the participants in the round-table conference Turkmenistan's Oil & Gas Sector: Opportunities for Businesslike Cooperation in the Field of Modern Technologies, Equipment and Services since it sounds the spirit of innovation and the magnitude of the tasks set by you to implement the strategic plans for developing Turkmenistan's oil and gas sector.

Already in the first years of independence you defined absolutely explicit strategic tasks for the oil and gas sector. These are to ensure full energy independence of the country; to expand export, including at the expense of building new arterial roads and, lastly, to diversify production towards processing of output.

Turkmenistan's position, outlined in your speech of welcome, on the issues of a comprehensive technological renewal of the industry and attracting new technologies, equipment and expertise of foreign companies, producers and possessors of technologies in all areas of the oil and gas sector's operation defines the strategy of drawing modern engineering processes and equipment. The Turkmenbashi complex of oil refineries, which was newly created at your initiative and under your direct guidance, is a colorful and graphic example of its implementation. The world public got convinced for yet another time on the example of executing the project to remodel and upgrade the Turkmen-bashi complex of oil refineries that the open doors policy pursued by you, the developed legislative base guaranteeing protection of investments, the stable political situation, progress of the economy and significant reserves of the state's hydrocarbon resources are favorable factors for attracting foreign investments and partners willing to invest capital, both in the form of financial resources and technologies, apply their know-how in the development of Turkmenistan's hydrocarbon resources.

Our esteemed Serdar!

Thanks to your incredible efforts, political foresight and purposefulness a decisive and irreversible step forward was taken towards attaining a common goal - to work out the Caspian Sea status - at the first summit of the Caspian states with the participation of the heads of all five states bordering the Caspian Sea, which was held at your initiative in April 2002.

The exchange of views, a friendly constructive atmosphere in the course of holding the round-table conference will make it possible to determine already in the immediate term the more effective forms and areas of cooperation between foreign and national companies of Turkmenistan, including in the Turkmen sector of the Caspian Sea. An International Exhibition and Conference slated for December as a follow-up on the Round-Table Conference will permit interested foreign companies and partners to demonstrate on the broadest possible scale new technologies and equipment in their arsenal and draw them nearer to taking specific steps towards cooperation in the said areas.

Our dear Serdar!

Today it is particularly important and pleasant to speak about the significance of your great and holy Rukhnama which a spiritual light illuminating to the Turkmens the road for centuries to come, guiding the people to master the loftiness of spirituality and great revival, facilitating the awakening of patriotism, courage, mutual respect and diligence. The great book outlines moral guideposts of each citizen of Turkmenistan in the golden age.

We, participants in the round-table conference, representing various countries and companies that have experience in conducting oil operations by applying cutting-edge technologies and equipment may confidently say that the path of the strategic revitalization of the oil and gas sector chosen by Turkmenistan, the methods and means of attaining it under your guidance will certainly be translated into life and we will apply

all our knowledge and potential in this process for mutual benefit.

Let this world be eternal like independent neutral Turkmenistan will be eternal in it!

Let this world be eternal like our permanent President Saparmurat Turkmenbashi will be eternal in it!

Let this world be eternal like the holy Rukhnama will be eternal in it!

With profound esteem and sincere respect to you,

Participants in the round-table conference Turkmenistan's Oil & Gas Sector: Opportunities for Businesslike Cooperation in the Field of Modern Technologies, Equipment and Services ■

Turkmenistan Renews Focus on Turkmenistan-Afghanistan-Pakistan Gas Pipeline

Through the efforts of Saparmurat Turkmenbashi, a steadfast advocate of regional energy pipeline system development, prospective investors and contractors are once again focusing their attention on a route for exporting Turkmen gas to Pakistan and on to India. A trilateral summit of Turkmenistan, Afghanistan, and Pakistan leaders on May 30 resulted in a signed agreement to build Turkmenistan-Afghanistan-Pakistan gas and oil pipelines.

The Turkmenistan president also signed a resolution to form a government working group to realize the project. This 1,500 kilometer long gas pipeline, designed to transport 30 billion cubic meters of gas, is slated to be completed by 2005.

Given existing world gas market trends, Turkmen gas prices at the Turkmen-Afghan border could be as high as US$60 for 1,000 cubic meters of gas when the pipeline is completed. Payments are expected to be made in free currency.

Under the tripartite agreement, the Pakistan and Afghanistan governments will also form working groups to develop and realize the gas pipeline project. Plans are under way for a meeting of the three nations' energy ministers and the subsequent formation of a managing committee composed of three experts from each country to supervise pre-feasibility study progress and to consult on the project's initial two phases.

The managing committee's principal task will be to attract major investors and companies with international experience in energy pipeline construction. In addition, the committee will submit a project progress report for a meeting of Afghanistan, Pakistan, and Turkmenistan leaders scheduled for October 2002 in Ashghabat. Proposals to establish an international consortium that would build and operate the gas pipeline are to be developed at that time.

President Niyazov Meets with Itera, Rosneft on Energy Projects

Separately, Turkmenistan president Saparmurat Niyazov discussed joint projects in oil and gas sector with Igor Makarov, CEO of the Itera International group of companies, and Sergei Bogdanchikov, president of Rosneft National Company, at a June 21 meeting. Makarov briefed the president on progress with regard to gas-purchase contracts and on Itera's performance of obligations to transport Turkmen fuel to the Ukraine. He noted that the company has diligently performed all terms and conditions and made prompt payments for the allocated fuel, including commodity supplies.

Discussing prospects for cooperation in developing Turkmen hydrocarbon fields, the Turkmenbashi emphasized the enormous potential posed by the exploration and development of the Caspian shelf. In addition, Bogdanchikov expressed interest in a detailed study of documents related to licensed blocks of the Turkmen sector of the Caspian Sea.

During the meeting, the parties also touched upon possibility of both companies' participating in Turkmen hydrocarbon resources transportation projects, including transportation via a trans-Afghanistan route.

Turkmenistan President Receives U.S. Ambassador

On June 24, the president of Turkmenistan, Saparmurat, Niyazov received the U.S. Extraordinary and Plenipotentiary Ambassador, Mrs. Laura Kennedy. The two discussed a wide range of issues relating to the emerging Afghan political situation, the role of Turkmenistan in economic that country's economic revival, and prospects for cooperation between Turkmenistan and the U.S. The parties stated the need for comprehensive assistance rebuilding the nation's economy to the lawfully elected Afghanistan government in. To that end, Saparmurat Turkmenbashi reviewed promising regional projects to construct Turkmenistan-Afghanistan-Pakistan gas and oil pipelines and to lay rail and automobile routes along the same route. All of these projects would require major foreign investment and modern technologies.

The two also discussed the status of and prospects for bilateral relations between Turkmenistan and the U.S. Both parties expressed their readiness to continue and strengthen mutually beneficial cooperation. ■

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